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DEPARTMENT OF ARCHAEOLOGY

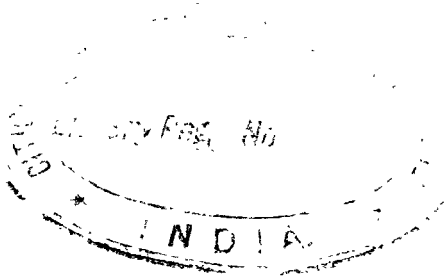
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THE

# JOURNAL

OF THE

# ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE THIRTY-FIFTH.




910.5

1865.

EDITED BY THE ASSISTANT-SECRETARY.

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# Royal Geographical Society,

1865.

## REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 22ND MAY.

THE Council, in submitting their Annual Report of the financial state and progress of the Royal Geographical Society, refer with satisfaction to the evidence it affords of another year of prosperity and usefulness.

*Members.*—Since the last Anniversary 162 Fellows have been elected, namely, 158 Ordinary (of whom 12 have paid their Life Compositions), 1 Honorary, and 3 Honorary Corresponding. During the same period the Society has lost 68 Fellows (besides 4 Honorary Corresponding), namely, 47 by death, and 21 by resignation; the total number on the list at the end of April of the present year being 1997 Ordinary, 65 Honorary Corresponding, and 5 Honorary Fellows. The number of Ordinary Fellows at the end of April, 1864, was 1907; the list shows, therefore, an increase of 90 during the year.

*Finances.*—As will be seen in the annexed Balance-sheet, the receipts for the year 1864 exceeded, by a small sum, the estimate given in the last year's Report; the actual amount (exclusive of the balance in hand) being 4977*l.* 8*s.* 6*d.*, and the estimated amount (also exclusive of the cash balance) 4965*l.* The disbursements show an excess over the estimate, a result due chiefly to certain changes

instituted in the course of the year, by which expenses which would otherwise not have been incurred until the year 1865, were entered in the past year's account. The excess of income over expenditure is, however, large, amounting to 1330*l.* 0*s.* 8*d.* The sum which it was estimated the Society would have available for investment during the year, namely, 896*l.* 5*s.*, has been far exceeded, 1796*l.* 5*s.* having been added to the funded property: this difference is due to the sum estimated as likely to be spent for the furtherance of Geography being far in excess of the actual amount so spent, and to the investment of part of the large balance in hand at the commencement of the year.

The Funded Capital of the Society, which consisted at the beginning of 1863 of 7500*l.*, and at the end of 1864 of 11,500*l.*, now amounts to 12,500*l.*, bearing interest to the amount of 395*l.* per annum, the last 1000*l.* being invested in 5 per cent. India Stock. The funded property is now about equal to the full amount of Life Compositions of living Members, the number of living Life-Compounders being 509. In addition to this the Council would call the attention of Fellows to the great increase, and the considerable present value, of the Society's property in Maps and Books, some details of which are given in this Report.

A legacy of 20*l.*, bequeathed to the Society by the late Beriah Botfield, Esq., has been received during the year.

The current accounts, mentioned in the last year's Report as standing against the Society at the close of the year, have all been liquidated, and the miscellaneous expenses are now paid regularly at the end of every month, thus greatly aiding the Finance Committee in their examination of the accounts. The Balance-sheet, Appendix A, shows that the accounts have been duly audited to the end of the year. In accordance with the last Report of Council they have further been examined to the end of April of the current year; by this means a complete check is kept over the Society's expenditure, and the Council constantly informed of the state of the Finances.

The sum of 75*l.* was paid to the widow of Mr. Greenfield, the late Assistant-Secretary, in lieu of ten days' salary due at the time of his death.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to the 31st Dec. 1864.

| Year. | Cash Receipts within the Year. | | | Cash Amounts invested in Funds. | | | Deducting Amounts invested in Funds; actual Expenditure. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £. | *s.* | *d.* | | | | £. | *s.* | *d.* |
| 1848 | 696 | 10 | 5 | .. | .. | | 755 | 6 | 1 |
| 1849 | 778 | 3 | 0 | .. | .. | | 1098 | 7 | 6 |
| 1850 | 1036 | 10 | 5 | .. | .. | | 877 | 2 | 10 |
| 1851 | 1056 | 11 | 8 | .. | .. | | 906 | 14 | 7 |
| 1852 | 1220 | 3 | 4 | .. | .. | | 995 | 13 | 1 |
| 1853 | 1917 | 2 | 6 | .. | .. | | 1675 | 6 | 0 |
| 1854 | 2565 | 7 | 8 | .. | .. | | 2197 | 19 | 3 |
| 1855 | 2584 | 7 | 0 | .. | .. | | 2636 | 3 | 1 |
| 1856 | 3372 | 5 | 1 | 533 | 10 | 0 | 2814 | 8 | 1 |
| 1857 | 3142 | 13 | 4 | 378 | 0 | 0 | 3180 | 19 | 9 |
| 1858 | 3089 | 15 | 1 | .. | .. | | 2944 | 13 | 6 |
| 1859 | 3471 | 11 | 8 | 950 | 0 | 0 | 3423 | 3 | 9 |
| 1860 | 6449 | 12 | 1 | 466 | 17 | 6 | 5406 | 3 | 7 |
| 1861 | 4792 | 12 | 9 | 1358 | 2 | 6 | 3074 | 7 | 4 |
| 1862 | 4659 | 7 | 9 | 1389 | 7 | 6 | 3095 | 19 | 4 |
| 1863 | 5256 | 9 | 3 | 1837 | 10 | 0 | 3655 | 4 | 0 |
| 1864 | 4977 | 8 | 6 | 1796 | 5 | 0 | 3617 | 7 | 10 |

In 1856 a Treasury Grant of 1000*l.* for the East African Expedition received.

In 1860 a Treasury Grant of 2500*l.* for the East African Expedition received.

STATEMENT showing the Progress of the INVESTMENTS of the Society from the Year 1832 to the 31st Dec. 1864.

| End of the Year, Dec. 31. | Cash invested. | | | Amount of Stock purchased. | | |
|---|---|---|---|---|---|---|
| | £. | *s.* | *d.* | £. | *s.* | *d.* |
| 1832 | 3657 | 10 | 0 | 4000 | 0 | 0 |
| 1833 | 4130 | 0 | 0 | 4500 | 0 | 0 |
| 1834 | 4426 | 0 | 0 | 4800 | 0 | 0 |
| 1835 | 4426 | 0 | 0 | 4800 | 0 | 0 |
| 1836 | 4426 | 0 | 0 | 4800 | 0 | 0 |
| 1837 | 4426 | 0 | 0 | 4800 | 0 | 0 |
| 1838 | 4426 | 0 | 0 | 4800 | 0 | 0 |
| 1839 | 4129 | 15 | 0 | 4500 | 0 | 0 |
| 1840 | 3788 | 10 | 0 | 4150 | 0 | 0 |
| 1841 | 2801 | 0 | 0 | 3150 | 0 | 0 |
| 1842 | 2801 | 0 | 0 | 3150 | 0 | 0 |
| 1843 | 2219 | 18 | 6 | 2578 | 4 | 4 |
| 1844 | 2219 | 18 | 6 | 2578 | 4 | 4 |
| 1845 | 2219 | 18 | 6 | 2578 | 4 | 4 |
| 1846 | 1933 | 1 | 0 | 2278 | 4 | 4 |
| 1847 | 2133 | 1 | 0 | 2502 | 6 | 2 |
| 1848 | 1886 | 16 | 8 | 2224 | 1 | 10 |
| 1849 | 1886 | 16 | 8 | 2224 | 1 | 10 |
| 1850 | 1886 | 16 | 8 | 2224 | 1 | 10 |
| 1851 | 1886 | 16 | 8 | 2224 | 1 | 10 |
| 1852 | 1886 | 16 | 8 | 2224 | 1 | 10 |
| 1853 | 1662 | 14 | 10 | 2000 | 0 | 0 |
| 1854 | 1662 | 14 | 10 | 2000 | 0 | 0 |
| 1855 | 1662 | 14 | 10 | 2000 | 0 | 0 |
| 1856 | 2216 | 4 | 10 | 2600 | 0 | 0 |
| 1857 | 2594 | 4 | 10 | 3000 | 0 | 0 |
| 1858 | 2594 | 4 | 10 | 3000 | 0 | 0 |
| 1859 | 3544 | 4 | 10 | 4090 | 0 | 0 |
| 1860 | 4011 | 2 | 4 | 4500 | 0 | 0 |
| 1861 | 5369 | 4 | 10 | 6000 | 0 | 0 |
| 1862 | 6758 | 12 | 4 | 7500 | 0 | 0 |
| 1863 | 8596 | 2 | 4 | 9500 | 0 | 0 |
| 1864 | 10365 | 7 | 4 | 11500 | 0 | 0 |

*Publications.*—The 33rd volume of the Journal, which was delayed in its appearance last year, owing to the death of the late Assistant-Secretary, has since been issued, and the Council have now the satisfaction of announcing the completion of the 34th volume, which may be had on application at the Society's apartments. The varied interest and general value of the memoirs which it contains, and the large number and good quality of the illustrations, will, it is hoped, make this volume acceptable and useful to the Fellows. In addition to an average number of memoirs, the present volume contains a treatise entitled 'Hints to

Travellers,' compiled and edited by a Committee, consisting of three Members of the Council, Mr. F. Galton, Vice-Admiral Sir George Back, and Admiral R. Collinson, aided by the Assistant-Secretary and the Curator of Maps. This treatise, although having the same title, is not a simple revision of the former work, published by the Society in 1854, and printed in the 24th volume of the Journal, but is entirely rewritten, with a view to including hints on the newest approved methods of exploration in little-known countries. The treatise will also be printed separately, as a pamphlet, and distributed *gratis* to intending travellers.

The 8th volume of Proceedings has been also completed since the last Anniversary, and contained six parts, instead of five, the usual number. Volume IX., comprising the reports of meetings of the present session, is now in course of publication, and three numbers have already been issued.

The Council have the pleasure of reporting a considerable increase in the sale of the Society's publications over the previous year (the first in which the item was separated in the accounts from other receipts), the total sales for 1864 being 105*l.* 12*s.* 7*d.*, against 65*l.* 8*s.* 8*d.* in 1863.

*Library.*—The accessions to the Library since the last Report have been 969 volumes of books and pamphlets, of which 72 were purchased. Amongst the more valuable additions may be mentioned Castelnau's 'Expedition dans les Parties Centrales de l'Amerique du Sud,' 15 vols.; and Gay's 'Historia Fisica y Politica de Chile,' in 26 vols., for both of which magnificent works the Society is indebted to the generosity of their Secretary, Clements R. Markham, Esq. The Council hope to be able hereafter to report the addition of other expensive works of this nature to the Library, particularly the French scientific Voyages, many of which are still desiderata. Another important accession is a series of the 'Selections from the Government Records of India,' consisting of 300 volumes, full of geographical information, which have been presented by the Secretary of State for India.

The Council have now the satisfaction to announce the completion of the new Library Catalogue, which was mentioned as in preparation in their last Report. The delay in its appearance has been due simply to the length of time required in compiling a Catalogue of so large a Library, on the very complete method

which has been adopted, namely, that of entering the contents of all collections of voyages, besides giving full titles to the rest of the Geographical works. The Catalogue consists of more than 500 pages, and the Council have decided, notwithstanding the considerable extra expense of compiling and printing, to present it gratis to Members, on their applying for their copies at the Society's apartments.

A classified Index of the Geographical works, including pamphlets and memoirs in Transactions, contained in the Library, is now being prepared by Mr. H. W. Bates, our energetic Assistant-Secretary, and will be printed as a Supplement to the Alphabetical Catalogue.

*Map-Collection.*—The accessions to this department have been unusually numerous this year, consisting of 8183 sheets of Maps and Charts, 6 Atlases, and 8 Diagrams. The facility of access to this important Collection has led to its being largely used during the past year by the Fellows, Travellers, and the Public generally. The following accessions deserve especial notice.

Our own Government have added the munificent donation of 7480 sheets of the Ordnance Survey, consisting chiefly of Maps on the larger scales, viz.:—Towns on the scale of 5 to 10 feet to the mile, and parishes on that of 25 inches to the mile; also a copy of Domesday-book in 33 volumes. All these have been arranged in Geographical order, amalgamated with the Society's Collection, and catalogued, and are now available for the use of the public. The Admiralty have presented 50 sheets of Charts. Most of the European Governments have responded to the applications for Maps. The Danish Government have added all the official, topographical, and geological Maps hitherto published, comprising 50 sheets. The French Government have presented 193 sheets of the grand Topographical Survey of France, commenced in 1833, on a scale of $\frac{1}{80000}$ ($\frac{3}{4}$ of an inch to the mile); also Maps of Algeria on 19 sheets; and the Hydrographical Department have added 91 sheets of Charts. The Prussian Government have supplied the principal Maps they have published, in 178 sheets. The Dutch Government have sent 5 sheets of the Topographical Map of Holland; the Swedish Government have added 8 sheets to the Geological Map commenced in 1863 by Erdmann, and the Government of Switzerland have completed their gift of Dufour's Official

Map, in 25 sheets. Maps of the Seats of War in America and New Zealand have been supplied by the Topographical Department of the War Office; and Maps of Kashmir by Captain J. G. Montgomerie, Colonel Scott's Map of India, Captain Grantham's Map of Natal, Van der Welde's Syria, and Johnston's Maps of Australia and New Zealand, have also been added to the Collection.

A small Library of Books has been purchased, and deposited in the Map-Room for the use of Travellers, consisting of about 50 volumes of elementary works and manuals.

*Instrument-Room.*—Since the last Anniversary, Instruments have been supplied at the cost of the Society to one Traveller only, Mr. R. B. N. Walker, who has recently left England to explore Equatorial Africa east of the Gaboon, to whom a complete set, costing 43*l.*, has been given. Several other travellers have, however, availed themselves of the advantages offered in selecting sets of instruments at their own expense.

The principal opticians of London have been again invited to deposit specimens of such instruments as travellers mostly use; but none of them have done so excepting the successor to Mr. Cary's establishment, Mr. Porter.

*Grants to Travellers.*—During the year 1864, one grant only was made to assist exploration, namely, that of 50*l.* to M. Gérhard Rohlfs in his journey across the Great Atlas from Marocco to Tripoli. The testimonial, value 25 guineas, given at the Anniversary to Mr. Gifford Palgrave for his adventurous journey across Arabia, is included in the Balance-sheet, under the head "Gold Medals." The sum of 1000*l.*, stated in the last year's Report as held in readiness for an exploration of the Nile Sources from Egypt, has not been called for; but 500*l.* have been voted by the Council to aid in an exploration having the same end in view, which will commence from another part of Africa, namely, the new expedition of Dr. Livingstone, now in preparation, from a point on the east coast towards the great Central Lakes. This sum is placed in the estimate of the current year's expenses, together with 200*l.*, which have been paid during the present financial year, namely, 100*l.* to Mr. R. B. N. Walker, in addition to the instruments mentioned above, and 100*l.* to Captain Wilson (through Sir Henry James), as a contribution towards the expense of ascertaining the exact relative level of the Dead Sea.

# APPENDIX A.

## BALANCE-SHEET FOR THE YEAR 1864.

*Receipts.*

| | £. | s. | d. | £. | s. | d. |
|---|---|---|---|---|---|---|
| Balance in Banker's hands 31st Dec., 1863 | 991 | 1 | 8 | | | |
| Ditto Accountant's Ditto | 17 | 8 | 8 | | | |
| | | | | 1008 | 10 | 4 |
| Subscriptions of 1236 Fellows .. .. .. | 2472 | 17 | 0 | | | |
| Entrance Fees of 152 Fellows .. .. .. | 456 | 3 | 0 | | | |
| Life Compositions of 31 Fellows .. .. | 756 | 10 | 0 | | | |
| Arrears of Subscriptions .. .. .. .. | 152 | 0 | 0 | | | |
| | | | | 3837 | 10 | 0 |
| Parliamentary Grant .. .. .. .. .. | 500 | 0 | 0 | | | |
| Royal Premium for 1863 and 1864 .. .. | 105 | 0 | 0 | | | |
| Legacy .. .. .. .. .. .. .. .. | 20 | 0 | 0 | | | |
| | | | | 625 | 0 | 0 |
| Advertisements .. .. .. .. .. .. | .. | .. | | 57 | 15 | 3 |
| Sale of Publications .. .. .. .. .. | .. | .. | | 105 | 12 | 7 |
| Rent of Stables .. .. .. .. .. .. | .. | .. | | 45 | 0 | 0 |
| Half Year's Dividend on 9500*l.* New 3 per Cents. .. .. .. .. .. .. | 138 | 6 | 11 | | | |
| Half Year's Dividend on 11,500*l.* New 3 per Cents. .. .. .. .. .. .. | 168 | 3 | 9 | | | |
| | | | | 306 | 10 | 8 |
| | | | | £5985 | 18 | 10 |

*Expenditure.*

| | | | £. | s. | d. |
|---|---|---|---|---|---|
| Rent, Taxes, and House Expenses .. | .. | .. | 596 | 5 | 10 |
| Salaries and Wages .. .. .. .. .. | .. | .. | 1187 | 12 | 5 |
| Library and Map-Room .. .. .. .. | .. | .. | 123 | 19 | 3 |
| Subscriptions, &c., returned .. .. .. | .. | .. | 34 | 0 | 0 |
| Gold Medals, &c. .. .. .. .. .. | .. | .. | 85 | 11 | 6 |
| Postages .. .. .. .. .. .. .. | .. | .. | 190 | 14 | 2 |
| Office Expenses .. .. .. .. .. | .. | .. | 247 | 13 | 2 |
| Publications and Illustrations .. .. | .. | .. | 1013 | 7 | 2 |
| Furniture and Repairs .. .. .. .. | .. | .. | 92 | 14 | 3 |
| Expeditions (amount voted to M. Gérhard Rohlfs) .. .. .. .. .. .. .. | .. | .. | 50 | 0 | 0 |
| Miscellaneous .. .. .. .. .. .. | .. | .. | 25 | 10 | 1 |
| | | | 3647 | 7 | 10 |
| Addition to Funded Property .. | .. | .. | 1796 | 5 | 0 |
| Balance in Banker's hands .. .. .. | £511 | 13 | 3 | | |
| Ditto Accountant's „ .. .. .. | 30 | 12 | 9 | | |
| | | | 542 | 6 | 0 |
| | | | £5985 | 18 | 10 |

REGINALD T. COCKS, *Treasurer.*

Audited 1st February, 1865.

THOMAS H. BROOKING,
G. BALFOUR,
CHARLES WHITE,
ROBERT F. COOKE. } *Auditors.*

# APPENDIX B.

## ESTIMATE FOR THE YEAR 1865.

*Receipts.*

| | £. | s. | d. |
|---|---|---|---|
| Cash Balance, 1st Jan., 1865 | 542 | 6 | 0 |
| Annual Subscriptions | 2550 | 0 | 0 |
| Life Compositions | 425 | 0 | 0 |
| Entrance Fees | 375 | 0 | 0 |
| Arrears of Subscriptions | 170 | 0 | 0 |
| Royal Premium | 52 | 10 | 0 |
| Parliamentary Grant | 500 | 0 | 0 |
| Sale of Publications | 100 | 0 | 0 |
| Dividends and Small Receipts | 420 | 0 | 0 |
| | £5144 | 16 | 0 |

*Expenditure.*

| | £. | s. | d. | £. | s. | d. |
|---|---|---|---|---|---|---|
| Journal and Proceedings | | | | 1150 | 0 | 0 |
| New Library Catalogue | | | | 250 | 0 | 0 |
| Rent, Taxes, and House Expenses | | | | 600 | 0 | 0 |
| Salaries (whole Staff and Wages | | | | 1100 | 0 | 0 |
| Library and Map-Rooms | | | | 220 | 0 | 0 |
| Office Expenses | | | | 220 | 0 | 0 |
| Postages | | | | 130 | 0 | 0 |
| Gold Medals and other Awards | | | | 100 | 0 | 0 |
| EXPEDITIONS:— | | | | | | |
| Dr. Livingstone | 500 | 0 | 0 | | | |
| Mr. R. B. N. Walker | 100 | 0 | 0 | | | |
| Contribution towards the Settlement of the Dead Sea Level | 100 | 0 | 0 | | | |
| M. Gerhard Rohlfs | 100 | 0 | 0 | | | |
| Instruments to Mr. Walker | 43 | 0 | 0 | | | |
| | | | | 843 | 0 | 0 |
| Balance | | | | 531 | 16 | 0 |
| | | | | £5144 | 16 | 0 |

# Library Regulations.

I. The Library will be open every day in the week (Sundays excepted) from 10·30 in the morning to 4·30 in the afternoon,* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week; and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

*Exceptions* :—

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month: but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council.

* On Saturday the Library is closed at 2·30 P.M.

# ROYAL GEOGRAPHICAL SOCIETY.

## Patron.

HER MAJESTY THE QUEEN.

## Vice-Patron.

H.R.H. THE PRINCE OF WALES.

## COUNCIL.

(ELECTED 22ND MAY, 1865.)

### President.

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## 1865.

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WRANGELL, Admiral Baron, St. Petersburg
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# FELLOWS.

## (To 1st November, 1865.)

N.B.—*Those having * preceding their names have compounded for life.*

| Year of Election. | |
|---|---|
| 1865 | Abbott, Hon. Reginald C. E. *All Souls' College, Oxford.* |
| 1863 | Abdy, Rev. Albert, M.A. 4, *Grove-place, High Cross, Tottenham.* |
| 1860 | A Beckett, Arthur M., Esq., F.R.C.S.E., 15, *Uxbridge-road, Subiton, S.W.* |
| 1851 | Abinger, W. F. Scarlett, Lord. *Guard's Club, S.W.* |
| 1865 | Achison, Frederick, Esq., C.E. 7, *College-hill, Highbury-park, North, N.* |
| 1855 | Acland, Prof. Henry Wentworth, M.D. *Oxford.* |
| 1861 | Acland, J. Barton Arundel, Esq. *Mount Peel, Canterbury, New Zealand.* |
| 1853 | Acland, Sir Peregrine Palmer F. P., Bart. *Fairfield, Somerset.* |
| 1830 | *Acland, Sir Thomas Dyke, Bart., F.R.S. *Waterloo-hotel, Jermyn-street, S.W.; and Killerton, Exeter, Devon.* |
| 1862 | 10 Adams, Edwin, Esq. |
| 1861 | Addington, Right Hon. H. U. 78, *Eaton-place, S.W.* |
| 1862 | Addison, Col. Thomas, C.B. *Aldershot.* |
| 1860 | Agnew, Sir Andrew, Bart., M.P. *Lochnaw-castle, Wigtownshire.* |
| 1859 | Ainslie, Col. H. Francis. *Junior United Service Club, S.W.; and Burlington-chambers, 180, Piccadilly, W.* |
| 1830 | *Ainsworth, W. Francis, Esq., F.S.A. *Ravenscourt-villa, New-road, Hammersmith, W.* |
| 1859 | Airlie, David Graham, Earl of. *Holly-lodge, Kensington, W.* |
| 1860 | Aitchison, David, Esq. 180, *Piccadilly, W.* |
| 1830 | *Albemarle, George Thomas, Earl of. 11, *Grosvenor-square, W.; Quiddenham-hall, Larlingford, Norfolk; and Elveden-hall, Suffolk.* |
| 1862 | Alcock, Sir Rutherford, K.C.B. *Athenæum Club, S.W.* |
| 1834 | 20*Alcock, Thomas, Esq. *Kingswood-warren, near Epsom, Surrey.* |
| 1838 | *Aldam, William, Esq. *Frickley-hall, near Doncaster.* |
| 1865 | Aldom, Joseph R. Esq., M.A., PH. DR. *Salway-house, Leyton, Essex.* |
| 1857 | Aldrich, Captain Robert D., R.N. *Windmill-road, Croydon, Surrey, S.* |
| 1830 | Alexander, Colonel Sir Jas. Ed., K.L.S., F.R.A.S., etc., 14th Regt. *United Service Club, S.W.; and Westerton-house, Bridge of Allan, N.B.* |
| 1864 | Allan, C. H., Esq. *Lloyd's, E.C.; and 31, Park-street, Stoke Newington, N.* |
| 1857 | Allan, George W., Esq. *Toronto, Canada.* |

| Year of Election | |
|---|---|
| 1858 | Allan, Jas., Esq. 122. *Leadenhall-street, E.C.* |
| 1865 | Allen, James Pearce, Esq. 13. *Waterloo-place, S.W.* |
| 1859 | Alsager, Thos. H., Esq. *Reform Club, S.W.; and Chislehurst, Kent.* |
| 1854 | 30 Ancona, J. S., Esq. 8, *John-street, Adelphi, W.C.* |
| 1860 | Anderdon, John Edmund, Esq. 4, *Stanhope-street, Hyde-park-gardens, W.* |
| 1863 | Anderson, Arthur, Esq. *Norwood-grove, Norwood, S.* |
| 1862 | Anderson, James, Esq. 1, *Billiter-court, City, E.C.* |
| 1861 | Anderson, John, Esq. *Shanghai.* |
| 1861 | *Anderson, Col. W., C.B. 19, *Gloucester-square, Hyde-park, W.* |
| 1856 | *Andrew, William P., Esq. |
| 1861 | Annesley, Col the Hon. Hugh, M.P. 25, *Norfolk-street, Park-lane, W.* |
| 1860 | *Anson, Sir John William Hamilton, Bart. 55, *Portland-place, S.W.* |
| 1853 | Ansted, Prof. D. T., M.A., F.R.S., etc. *Athenæum Club, S.W.; and Bonair St. Martin, Guernsey.* |
| 1863 | 40 Anstey, G. A., Esq. 14, *Sussex-gardens, Hyde-park, W.* |
| 1857 | Anstruther, M.-Gen. Philip, C.B., Madras Artil. 1, *Chapel-street, Grosvenor-place, S.W.* |
| 1864 | Anstruther, Lieut. R. L., Rifle Brigade. *Montreal, Canada.* |
| 1830 | *Antrobus, Sir Edmund, Bart. 146, *Piccadilly, W.; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.* |
| 1863 | Arber, Edward, Esq., A.K.C. *Admiralty, W.C.; Civil Service Club; and 31, Duke-street, Grosvenor-square, W.* |
| 1858 | Arbuthnot, George, Esq. 23, *Hyde-park-gardens, W.* |
| 1862 | Arbuthnot, Lieut. George, R.H.A. *Cowarth, Sunningdale.* |
| 1860 | Arceleckne, Andrew, Esq. 35, *Albemarle-street, W.* |
| 1861 | Archer, Graves Thos., Esq. 1, *Ennismore-place, Prince's-gate, S.W.* |
| 1855 | *Arden, Richard Edward, Esq. *Sudbury-park, Middlesex, S.W.* |
| 1858 | 50*Armistead, Rev. Charles John, M.A., F.S.A. *University Club, S.W.; National Club, S.W.; and Roundhay, near Leeds; H.M.S. 'Pembroke,' Harwich.* |
| 1863 | Armitage, Edward, Esq. 3, *Hall-road, St. John's-wood, N.W.* |
| 1857 | Armstrong, Alexander, Esq., M.D., R.N., F.R.C.P., Deputy Inspector-General, Royal Melville Hospital, Chatham. *Junior United Service Club, S.W.* |
| 1830 | *Arrowsmith, John, Esq., F.R.A.S. 35, *Hereford-square, Old Brompton, S.W.* |
| 1864 | Arthur, John, Esq. 9, *Notting-hill-square, W.* |
| 1863 | Arthur, Commander William, R.N. *H.M.S. 'Excellent,' Portsmouth.* |
| 1858 | Ashburton, Lord. 16, *St. James's-square, S.W.* |
| 1864 | *Ashton, R. J. Esq. 39, *Lombard-street, E.C.* |
| 1853 | *Ashwell, James, Esq., M.A., F.G.S. |
| 1851 | Astley, Francis D. P., Esq., M.R.I. 67, *Eaton-square, S.W.* |
| 1830 | 60*Atkins, John Pelly, Esq., F.S.A. *Holsted-house, near Sevenoaks.* |
| 1860 | Attwell, Professor Henry. *Barnes, S.W.* |
| 1861 | Aubin, William, Esq. 3, *Furnival's-inn, Holborn, E.C.* |
| 1859 | Austen, Capt. Henry H. Godwin, 24th Foot, Trig. Survey, Panjab. *Junior United Service Club, S.W.; and Chilworth-manor, Guildford, Surrey.* |

| Year of Election. | |
|---|---|
| 1863 | Austin, John G., Esq. 45, *Porchester-terrace, W.* |
| 1854 | Ayrton, Acton S., Esq., M.P. 3, *Essex-court, Temple, E.C.* |
| 1845 | *Ayrton, Frederick, Esq. |
| 1836 | *Back, Vice-Adm. Sir Geo., D.C.L., F.R.S. 109, *Gloucester-place, Portman-sq., W.* |
| 1863 | *Backhouse, John Henry, Esq. *Darlington.* |
| 1864 | Badger, Rev. Geo. P. 17, *Dawson-place, Bayswater, W.* |
| 1863 | 70 Bagot, Christopher N., Esq. *Oriental Club, W.* |
| 1862 | Bagot, Capt. L. H. 55, *Inverness-terrace, W.* |
| 1859 | Bailey, L. C., Esq., Staff Commander, R.N. *Topographical Department, New-street, Spring-gardens, S.W.* |
| 1857 | Baillie, Major John, Bengal Staff Corps. *Jhansi, Central India.* |
| 1862 | Baillie, John B., Esq. *Leys-castle, Inverness.* |
| 1861 | Baillie, William Henry, Esq. 67, *Eaton-square, S.W.* |
| 1861 | *Baker, John, Esq. |
| 1862 | Baker, Capt. Robert B. *Oriental Club, Hanover-square, W.* |
| 1855 | Baker, Capt. Wm. T., 85th Regt. *Junior United Service Club, S.W.; and* 31, *Grosvenor-place, Bath.* |
| 1861 | Baldwin, William Charles, Esq. *Leyland-vicarage, Preston.* |
| 1861 | 80 Balfour, David, Esq. *Balfour-castle, Kirkwall, N.B.* |
| 1847 | Balfour, Major-General George, R.A., C.B. 27, *Gordon-street, Gordon-square, W.C.; and Oriental Club, Hanover-square, W.* |
| 1853 | Balfour, John, Esq. *New South Wales; and Colinton, Queensland.* |
| 1863 | Balfour, John Osborn, Esq. 26, *Inverness-terrace, W.* |
| 1863 | Balfour, William, Esq. 49, *Oxford-terrace, Hyde-park, W.* |
| 1860 | Ball, John, Esq. *Oxford and Cambridge Club, S.W.* |
| 1863 | Bamforth, Rev. J., Principal of Doveton College. *Madras.* |
| 1852 | Bancroft, Capt. W. C., 16th Regt. *Aide de Camp and Military Sec., King's House, Jamaica; M'Gregor and Co., Charles-street, S.W.* |
| 1862 | Banks, George F., Esq., Surgeon R.N. *Llandudno, North Wales.* |
| 1858 | Bannerman, Sir Alexander, Bart. *Crimonmogate, Aberdeenshire.* |
| 1840 | 90*Barclay, Arthur Kett, Esq., F.R.S. *Park-street, Southwark, S.E.; and Bury-hill, Dorking, Surrey.* |
| 1863 | Barford, A. H., Esq., M.A. 1, *Cornwall-terrace, Regent's-park, N.W.* |
| 1863 | Baring, Alexander, Esq. 58, *Lowndes-square, S.W.* |
| 1838 | Baring, Rt. Hon. Sir Francis T., Bart., F.R.S. *Stratton-park, Andover, Hants.* |
| 1835 | *Baring, John, Esq. *Oakwood, Chichester.* |
| 1844 | *Baring, Thomas, Esq., M.P. 41, *Upper Grosvenor-street, W.* |
| 1862 | Barlee, Frederick Palgrave, Esq. *Perth, Western Australia.* |
| 1853 | Barnett, Admiral Edward. 14, *Woburn-square, W.C.* |
| 1864 | Barnett, H. C., Esq. *Care of Alexander Whytock, Esq.*, 9, *George-street, Edinburgh.* |
| 1858 | Barratt, James, Esq. *Lymne-hall, near Harrington, Cheshire.* |
| 1862 | 100 Barrett-Lennard, Capt. C. E. 7, *Albemarle-street, W.* |

| Year of Election | |
|---|---|
| 1859 | Barrington, the Hon. George. 19, *Hertford-street, Mayfair, W.* |
| 1843 | Barrow, John, Esq., F.R.S., F.S.A. 17, *Hanover-terrace, Regent's-park, N.W.* |
| 1863 | Barry, Alfred, Esq. *Beckenham, Kent, S.W.* |
| 1857 | Bartholomew, John, Esq. 4, *North-bridge, Edinburgh.* |
| 1861 | Bartlett, Herbert Lewis, Esq. 3, *King-street, St. James's, S.W.* |
| 1862 | Barton, Dr. Alfred. *Oriental Club, W.* |
| 1864 | Basevi, Capt. J. P., R.E. 190, *Belgrave-road, S.W.; Messrs. Grindlay & Co., Parliament-street, S.W.* |
| 1837 | *Bateman, James, Esq., F.R.S., L.S. *Knypersley-hall, Staffordshire.* |
| 1859 | Bateman, John F., Esq., C.E. 16, *Great George-street, Westminster, S.W.* |
| 1843 | 110 Bathoe, Charles, Esq. 28, *York-place, Portman-square, W.* |
| 1864 | Bax, Capt. Henry G. 2, *Sussex-place, Hyde-park-gardens, W.* |
| 1858 | Baxendale, Joseph H., Esq. 14, *Chester-terrace, Regent's-park, N.W.; and Scott's-bridge, near Rickmansworth, Herts.* |
| 1863 | Bayley, H. Esq. *Blackheath-park, Kent.* |
| 1862 | Bayly, Lieut.-Col. John, R.E. *Ordnance Survey Office;* 131, *St. George's-road, Pimlico, S.W.* |
| 1862 | Baynes, Lieut.-Col. R. Stuart. *Army and Navy Club, S.W.; and* 38, *Jermyn-street, S.W.* |
| 1852 | Beardmore, Nathaniel, Esq., C.E. 30, *Great George-street, Westminster, S.W.* |
| 1858 | Beauclerk, Aubrey de Vere, Esq. *Ardglass, Co. Belfast.* |
| 1854 | Beaufort, William Morris, Esq., Bengal Civil Service. *Bengal.* |
| 1856 | Beaumont, John Aug., Esq. *Wimbledon-park-house, Wimbledon, S.W.; and* 50, *Regent-street, W.* |
| 1851 | 120*Beaumont, Wentworth B., Esq., M.P. 144, *Piccadilly, W.; Bywell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.* |
| 1863 | Beavan, Hugh J. C., Esq., F.A.S.L. 13, *Blandford-square, Regent's-park, N.W.;* 4, *Middle-temple-lane, E.C.; and Junior Carlton Club, S.W.* |
| 1865 | Bebb, Horatio, Esq. 13, *Gloucester-place, W.; and Leamington.* |
| 1830 | Becher, Capt. Alex. B., R.N. *Admiralty, S.W.; and* 13, *Dorset-place, Dorset-square, N.W.* |
| 1861 | Beckett, James F., Esq., Staff Commander, R.N., F.R.S.A. 6, *Boyne-terrace, Notting-hill, W.* |
| 1838 | *Beckford, Francis L., Esq. *Travellers' Club, S.W.* |
| 1859 | Bedford, Capt. G. Augustus, R.N. 5, *Ormond-terrace, Regent's-park, N.W.* |
| 1860 | Beeton, Samuel Orchart, Esq. 248, *Strand, W.C.; and Turner, Middlesex, W.* |
| 1861 | *Begbie, James, Esq. 27, *Mark-lane, E.C.* |
| 1860 | Begbie, Thomas Stirling, Esq. 4, *Mansion-house-place, E.C.* |
| 1846 | 130 Beke, Charles Tilstone, Esq., PH. DR., F.S.A., &c. *Bekesbourne-house, near Canterbury.* |
| 1853 | Belcher, Rev. Brymer. *St. Gabriel's, Pimlico, S.W.* |
| 1830 | *Belcher, Rear-Adm. Sir Edward, C.B., F.R.A.S. 22A, *Connaught-square, W.* |
| 1858 | Beldam, Edw., Esq. 1, *Stone-buildings, Lincoln's-inn, W.C.; and Royston, Herts.* |
| 1848 | Beldam, Joseph, Esq. *Royston, Herts.* |
| 1863 | Belmore, The Earl of. *Dover-street, Piccadilly, W.* |

| Year of Election. | | |
|---|---|---|
| 1863 | | *Bell, Charles, Esq. *Richmond.* |
| 1858 | | Bell, C. Davidson, Esq., Surveyor-General, Cape of Good Hope. *Cape Town.* |
| 1850 | | *Bell, James, Esq. 1, *Devonshire-place, Portland-place, W.* |
| 1830 | | *Bell, James Christian C., Esq. 42, *Westbourne-terrace, W.; and* 15, *Angel-court, Throgmorton-street, E.C.* |
| 1864 | 140 | Bellamy, Edward, Esq. 1, *St. George's-road, Eccleston-square, W.* |
| 1830 | | *Bennett, John Joseph, Esq., F.R.S. *British Museum, W.C.* |
| 1857 | | Bennett, J. Risdon, Esq., M.D. 15, *Finsbury-square, E.C.* |
| 1856 | | *Benson, Robert, Esq. 16, *Craven-hill-gardens, Bayswater, W.* |
| 1856 | | *Benson, William, Esq., Barrister-at-Law. 16, *Craven-hill-gardens, Bayswater, W.* |
| 1830 | | Bentham, George, Esq., Pres. L.S. 25, *Wilton-place, S.W.* |
| 1833 | | Bentley, Richard, Esq. *New Burlington-street, W.* |
| 1859 | | Berens, H. Hulse, Esq. *Sole-ross, Platt's Crop, Kent.* |
| 1861 | | Berkley, George, Esq., C.E. 24, *Great George-street, S.W.* |
| 1865 | | Bernard, P. N., Esq. 37, *Connaught-square, W.; and* 8, *Finch-lane, E.C.* |
| 1856 | 150 | Berry, Josiah, Esq. 16, *Regent-square, W.C.* |
| 1863 | | Best, William, Esq. 85, *Orford-terrace, Hyde-park, W.* |
| 1842 | | *Bethune, R.-Admiral C. R. Drinkwater, C.B. 56, *Westbourne-ter., Hyde-park, W.* |
| 1864 | | Betts, E. L., Esq. *Preston-hall, Maidstone, Kent.* |
| 1836 | | Betts, John, Esq. 115, *Strand, W.C.* |
| 1862 | | Bicker-Caarten, Peter, Esq. 30, *Northumberland-place, Bayswater, W.* |
| 1860 | | Bidder, G. Parker, Esq., C.E. 24, *Gt. George-st., S.W.; and Mitcham, Surrey, S.* |
| 1865 | | Bidwell, Charles Toll, Esq. *Garrick Club, 35, King-street, Covent Garden, W.C.; and* 28, *Grosvenor-street, Eaton-square, S.W.* |
| 1863 | | Bigg, Thos., Esq. *Cronstadt-house, Abbey-wood, Kent.* |
| 1859 | | Bigge, Frederick W., Esq. *Union Club, S.W.* |
| 1850 | 160 | Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square, W.* |
| 1864 | | Bingham, P., Esq. *Athenæum Club, S.W.* |
| 1858 | | Birch, Augustus F., Esq., M.A. Fellow of King's College, Cambridge; Assistant Master, Eton College. |
| 1860 | | Birch, H. W., Esq. 46, *Welbeck-street, Cavendish-square, W.* |
| 1858 | | Birch, John William, Esq. 9*b*, *New Broad-st., E.C.; and* 27, *Cavendish-sq., W.* |
| 1859 | | Birch, Capt. Thomas, R.N. *United Service Club, S.W.* |
| 1862 | | *Birchill, B. H. H., Esq. *St. Stephen's, Bedfont, near Hounslow.* |
| 1858 | | Bishop, George, Esq., F.R.A.S. *Union Club, S.W.; and The Meadows, Twickenham, S.W.* |
| 1861 | | Bishop, James, Esq. |
| 1838 | | *Blaauw, William H., Esq., M.A., F.S.A., F.Z.S. *Beechlands, near Uckfield, Sussex.* |
| 1860 | 170 | *Black, Francis, Esq. 6, *North-bridge, Edinburgh.* |
| 1858 | | Blackett, Henry, Esq. 13, *Great Marlborough-street, W.* |
| 1849 | | Blackie, W. Graham, Esq., PH. DR. 36, *Frederick-street, Glasgow.* |
| 1861 | | *Blackney, William, Esq., Assistant-Paymaster, R.N. *Hydrographic Office, S.W.* |
| 1857 | | Blackstone, Alan C., Esq. *Board of Works, Whitehall-place, S.W.* |
| 1862 | | *Blackstone, Frederick Elliot, Esq., B.C.L. *British Museum, W.C.* |

| Year of Election | |
|---|---|
| 1854 | Blaine, D. Roberton, Esq., Barrister-at-Law. 3, *Paper-buildings, Temple, E.C.; and* 8, *Southwick-place, Hyde-park-square, W.* |
| 1857 | *Blake, Wollaston, Esq. 8, *Devonshire-place, W.* |
| 1859 | Blakeley, Capt. Alexr., R.A. 34, *Montpelier-square, Rutland-gate, S.W.* |
| 1857 | Blakiston, Captain Thomas, R.A. 28, *Wellington-street, Woolwich, S.E.* |
| 1830 | 180*Blanshard, Henry, Esq., F.R.A.S. |
| 1861 | *Blanshard, Henry, Esq. 78, *Westbourne-terrace, W.; and* 53, *Chancery-lane, W.C.* |
| 1857 | Blanshard, Richard, Esq. *Fairfield, Lymington, Hants.* |
| 1865 | Blaxall, Fras. H., Esq., M.D. *Teaching, near Colchester.* |
| 1854 | Blencowe, W. Robert, Esq. *The Hook, Lewes.* |
| 1861 | Blenkin, William, Esq. *Addlestone, near Chertsey, Surrey.* |
| 1839 | *Blewitt, Octavian, Esq. 4, *Adelphi-terrace, Strand, W.C.* |
| 1864 | Bloe, Edward, Esq. 4, *Manchester-square, W.* |
| 1861 | Bloxsome, Oswald J., Esq. *Clarence-house, Bognor, Sussex.* |
| 1837 | *Blunt, Jos., Esq. |
| 1863 | 190*Blunt, Wilfred, Esq. |
| 1858 | Bohn, Henry G., Esq. *York-st., Covent-garden, W.C.; and North-end-house, Twickenham, S.W.* |
| 1863 | Boileau, Sir John P., Bart., F.R.S. 20, *Upper Brook-street, W.* |
| 1862 | Bolton, Capt. Francis John, 12th Regt. *Chatham.* |
| 1861 | Bompas, George Cox, Esq. 15, *Stanley-gardens, Kensington-park, W.* |
| 1864 | Bone, J. W., Esq., B.A., F.L.S. 41, *Bedford-square, W.C.* |
| 1861 | Bonney, Charles, Esq. *Adelaide, Australia.* |
| 1858 | Bonnor, George, Esq. 49, *Pall-mall, S.W.; and* 2, *Bayswater-terr., Kensington-square, W.* |
| 1859 | Borough, Sir Edward, Bart. 4, *Nassau-street, Dublin.* |
| 1845 | *Borrer, Dawson, Esq. *Altmont Ballon, Co. Carlow, Ireland.* |
| 1856 | 202*Botcherby, Blackett, Esq., M.A. 48, *Brompton-row, S.W.* |
| 1858 | *Botterill, John, Esq. *Flower-bank, Burley-road, Leeds.* |
| 1860 | Boustead, John, Esq. 34, *Craven-street, Strand, W.C.* |
| 1865 | Bouverie, P. P., Esq. 16, *Hill-street, Berkeley-square, W.* |
| 1855 | Bovet, Charles, Esq. 30, *Camden-road-villas, N.W.* |
| 1861 | *Bowen, Charles Christopher, Esq. *Christchurch, Canterbury, New Zealand.* |
| 1854 | *Bowen, Sir George Ferguson, K.C.M.G., M.A. *Governor of Queensland, Australia.* |
| 1836 | Bower, George, Esq. 6, *Tokenhouse-yard, E.C.* |
| 1862 | Bowie, John, Esq. *Conservative Club, S.W.* |
| 1833 | Bowles, Admiral Sir William, K.C.B. 8, *Hill-street, Berkeley-square, W.* |
| 1856 | 210 Bowman, John, Esq. 9, *King William-street, E.C.* |
| 1862 | Boyce, Rev. W. B., Secretary to Wesleyan Missionary Society. 38, *Milner sq., Islington, N.; and Wesleyan Mission House, Bishopsgate-street, E.C.* |
| 1845 | *Boyd, Edward Lennox, Esq., F.S.A. 35, *Cleveland-square, Hyde-park, W.* |
| 1865 | Boyle, Frederick, Esq. *Serbridge-hall, Newcastle, Staffs.* |
| 1856 | Boyne, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, S.W.; Brancepeth-castle, Durham; and Burwarton-hall, Ludlow, Salop.* |

| Year of Election. | |
|---|---|
| 1851 | Bracebridge, Charles Holte, Esq. *Atherstone, Warwick.* |
| 1858 | Braddell, Thomas, Esq. *Magistrate at Penang.* |
| 1862 | Braithwaite, Isaac, Esq. 68, *Old Broad-street, E.C.* |
| 1863 | *Bramley-Moore, John, Esq. *Langley-lodge, Gerrard's Cross, Bucks.* |
| 1857 | Bramston, Thos. W., Esq. *Carlton Club, S.W.; and Skreens, Chelmsford, Essex.* |
| 1859 | 220*Brand, James, Esq. 109, *Fenchurch-street, E.C.* |
| 1860 | Brassey, T., Esq. 4, *Great George-street, S.W.; and 56, Lowndes-square, S.W.* |
| 1857 | Brasted, Rev. J. B. |
| 1859 | Braybrooke, Philip Watson. *Assistant Colonial Secretary, Ceylon.* |
| 1861 | *Brenchley, Julius, Esq. *Oxford and Cambridge Club, S.W.; and Milgate, near Maidstone, Kent.* |
| 1846 | Brereton, Rev. C. D., M.A. *Little Massingham, Rougham, Norfolk.* |
| 1833 | *Brereton, Rev. John, LL.D., F.S.A. *Bedford.* |
| 1834 | *Breton, Wm. Henry, Esq., Commander R.N., M.R.I. 15, *Camden-crescent, Bath.* |
| 1862 | Brett, Charles, Esq. 44, *Cleveland-square, W.* |
| 1858 | Bridges, Nathaniel, Esq. |
| 1852 | 230*Brierly, Oswald W., Esq. 8, *Lidlington-pl., Harrington-sq., Hampstead-rd., N.W.* |
| 1861 | *Bright, Sir Charles T., M.P., F.R.A.S. 1, *Victoria-street, Westminster, W.; and* 12, *Upper Hyde-park-gardens, W.* |
| 1860 | Bright, James, Esq., M.D. |
| 1854 | Brine, Major Frederic, R.E. *Army and Navy Club, S.W.; Claremont, Sidmouth; and Tregantle Fort, near Devonport.* |
| 1856 | Brine, Commander Lindesay, R.N. *Army and Navy Club, S.W.; H.M.S. 'Racer,' Mediterranean; and Claremont, Sidmouth.* |
| 1861 | Bristowe, Henry Fox, Esq. 53, *Rutland-gate, S.W.* |
| 1861 | Broadwater, Robert, Esq. 3, *Billiter-square, Fenchurch-street, E.C.* |
| 1864 | Brodie, G. S., Esq. 27, *Pembridge-square, W.* |
| 1861 | Brodie, Walter, Esq. 13, *Delamere-terrace, Hyde-park, W.* |
| 1861 | Brodie, William, Esq. *Eastbourne, Sussex.* |
| 1863 | 240*Brodrick, George C., Esq. 32A, *Mount-street, W.* |
| 1838 | Brooke, Sir James, K.C.B., D.C.L. *Barrator, Horrabridge, S. Devon; Athenæum Club, S.W.; and Sarawak, Borneo.* |
| 1864 | Brooke, Sir Victor A., Bart. *Colebrooke-park, Co. Fermanagh, Ireland.* |
| 1856 | Brooke, Major William, 30th Regt. 1, *Clifton-terrace, Ramsgate.* |
| 1862 | Brookes, Thomas, Esq. *Muttock-lane, Ealing, W.* |
| 1856 | *Brooking, George Thomas, Esq. 25, *Sussex-gardens, Hyde-park, W.* |
| 1856 | *Brooking, Marmaduke Hart, Esq. 11, *Montagu-place, Bryanston-square, W.* |
| 1843 | *Brooking, Thomas Holdsworth, Esq. 14, *New Broad-street, City, E.C.; and* 5, *Norfolk-crescent, Hyde-park, W.* |
| 1863 | Brophy, C. A., Esq. *Sidmouth.* |
| 1863 | *Broughall, William, Esq. *Broadwater, Down, Tunbridge-Wells.* |
| 1850 | 250 Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, *Berkeley-square, W.; and Erlestoke-park, Westbury, Wilts.* |
| 1859 | Broughton, L. P. Delves, Esq. 73, *Belgrave-road, S.W.* |
| 1856 | *Brown, Daniel, Esq. *The Elms, Larkhall-rise, Clapham, S.* |

| Year of Election. | |
|---|---|
| 1864 | Brown, Edwin, Esq., F.G.S. *Burton-on-Trent.* |
| 1863 | Brown, James, Esq., M.P. *Rossington, Yorkshire.* |
| 1860 | Brown, Jas. P., Esq. 80, *Cornhill, E.C.; and Sierra Serra de Cocoes, Minas Geroes, Brazil.* |
| 1865 | Brown, James R., Esq., F.R.S.N.A. Copenhagen. *Scaleby Lodge*, 241, *Camden-road, N.* |
| 1861 | *Brown, John Allen, Esq. 3, *Newcastle-place, Clerkenwell, E.C.; and Scaleby-lodge, Camden-road, N.* |
| 1856 | *Brown, Samuel, Esq. 11, *Lombard-st., E.C.; and The Elms, Larkhall-rise, Clapham, S.* |
| 1858 | *Brown, Thomas, Esq. 8, *Hyde-park-terrace, Hyde-park, W.* |
| 1859 | 260 Brown, William, Esq. *Lant's-road, Clapham-park, S.* |
| 1863 | Browne, H. H., Esq. 70, *Westbourne-park-villas, Harrow-rd., Paddington, W.* |
| 1862 | Browne, John Comber, Superintendent and Inspector of Government Schools. *Port Louis, Mauritius.* |
| 1858 | Browne, John H., Esq. *Port Gawler, S. Australia.* |
| 1864 | Browne, Capt. Wade. 6, *Charles-street, Berkeley-square, W.* |
| 1858 | Browne, William J., Esq. *Port Gawler, S. Australia.* |
| 1852 | Browning, Henry, Esq. 72, *Grosvenor-street, W.; and Ampton-hall, Bury St. Edmund's.* |
| 1856 | *Browning, Thomas, Esq. 6, *Whitehall, S.W.* |
| 1859 | Bruce, Henry Austin, Esq., M.P. *Duffryn, Aberdare, Glamorganshire.* |
| 1864 | Bruce, Samuel, Esq. *Thorndale, Belfast.* |
| 1863 | 270 Brunton, John, Esq., M.I.C.E., F.G.S. |
| 1856 | Bryant, Walter, Esq., M.D., F.R.C.S. 7, *Bathurst-street, Hyde-park-gardens, W.* |
| 1844 | Bryden, William, Esq. 6, *Great Queen-street, Westminster, S.W.* |
| 1843 | *Buchan, John Hitchcock, Esq. *The Grove, Hanwell, W.* |
| 1863 | Buchanan, Walter, Esq., M.D. 9, *James-street, Buckingham-gate.* |
| 1859 | Buckland, Edward C., Esq. 36, *Lansdowne-road, Notting-hill, W.* |
| 1863 | Budd, J. Palmer, Esq. |
| 1865 | Buller, Edward M., Esq., M.P. *Old Palace-yard, S.W.; and Dulhorn-hall, Cheadle, Staffs.* |
| 1863 | Bullock, Commander Charles J., R.N. *Hydrographic Office, S.W.* |
| 1830 | *Bullock, Rear-Admiral Frederick. *Woolwich, S.E.* |
| 1864 | 280 Bullock, W. H., Esq. *Grosvenor-hill, Wimbledon, S.W.* |
| 1860 | *Bunbury, Sir Charles James Fox, Bart.; F.R.S. *Barton-hall, Bury St. Edmund's.* |
| 1839 | Bunbury, E. H., Esq., M.A. 35, *St. James's-street, S.W.* |
| 1860 | Bunyon, C. J., Esq. 4, *Queen's-terrace, Queen's-gate, Kensington-gore, W.* |
| 1861 | Burges, William, Esq. *Fethard, Co. Tipperary.* |
| 1863 | Bundock, F., Esq. *Windham Club, S.W.* |
| 1863 | Burgoyne, Capt. Hugh Talbot R.N., V.C. 8, *Gloucester-gardens, Hyde-park, W.* |
| 1864 | Burn, Robert, Esq. 5, *Clifton-place, Sussex-square, W.* |
| 1863 | *Burns, John, Esq. 1, *Park-gardens, Glasgow; and Castle Wemyss by Greenock, N.B.* |
| 1861 | *Burt, Higford, Esq. 23, *Eaton-place, S.W.; and Aldermanston-court, Berkshire.* |

| Year of Election | |
|---|---|
| 1857 | 290 Burstal, Capt. E., R.N. 6, *Park-villas, Lower Norwood, S.* |
| 1830 | *Burton, Alfred, Esq. 36, *Marine, St. Leonard's.* |
| 1833 | *Burton, Decimus, Esq., F.R.S. 6, *Spring-gardens, S.W.; and St. Leonard's-cottage, Hastings.* |
| 1859 | *Burton, Capt. Richd. Fras., 18th Regt. Bombay N.I., H.B.M. Consul at Santos, Brazil. 14, *St. James's-square, S.W.* |
| 1847 | Burton, S. S., Esq. *Churchill-house, Daventry.* |
| 1858 | Bury, William Coutts, Viscount, M.P. 48, *Rutland-gate, S.W.* |
| 1861 | Bush, Rev. Robert Wheler, M.A. 1 *Milner-square, Islington, N.* |
| 1861 | Butler, Charles, Esq. 13, *Sussex-square, W.* |
| 1859 | Butler, Edward, Esq. *Lansdowne-road, Hyde-park, W.* |
| 1860 | *Butler, Rev. Thomas. *Rector of Langar, Nottinghamshire.* |
| 1862 | 300*Buxton, Chas., Esq., M.P. 7, *Grosvenor-crescent, S.W.; and Fox-warren, Surrey.* |
| 1858 | *Buxton, Sir Thomas Fowell, Bart., M.P. *Brick-lane, N.E.* |
| 1863 | Byron-Moore H., Esq. *Survey Office, Melbourne, Australia.* |
| 1864 | Bythesea, Capt. J., R.N., V.C. 20, *Grosvenor-place, Bath.* |
| | |
| 1830 | *Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, *Brick-court, Temple, E.C.*; 52, *Portland-place, W.; and Aldwick, Sussex.* |
| 1857 | *Caldwell, Capt. Henry, R.N. *H.M.S. 'Mersey,' Portsmouth; and* 3, *Audley-sq., W.* |
| 1863 | Callaghan, Thos. F., Esq. |
| 1863 | Calthorpe, Lord. 33, *Grosvenor-square, W.* |
| 1861 | Calthorpe, the Hon. Augustus Gough. 33, *Grosvenor-square, W.* |
| 1855 | *Calthorpe, the Hon. F. H. Gough, M.P. 33, *Grosvenor-square, W.* |
| 1859 | 310 Calvert, Edmund, Esq. *British Embassy, Constantinople.* |
| 1854 | Calvert, Frederic, Esq., Q.C. 9, *St. James's-place, S.W.; and* 8, *New-square, Lincoln's-inn, W.C.* |
| 1830 | *Camden, George Charles, Marquis, K.G., D.C.L., M.A. *Wilderness-park, Sevenoaks, Kent; and Bayham-abbey, Sussex.* |
| 1858 | Cameron, Capt. Charles D. |
| 1861 | Cameron, Donald, Esq. *Auchnacarry, Invernesshire.* |
| 1864 | Cameron, J., Esq. *Singapore. Care of Messrs. Smith, Elder, and Co.* |
| 1858 | Cameron, Major-General Duncan Alexander, R.E. C.B. *New Zealand.* |
| 1861 | Campbell, Capt. Frederick, R.N. 12, *Connaught-place, Hyde-park, W.* |
| 1861 | Campbell, James, Esq. 158, *Regent-street, W.; and Thornton Steward, York.* |
| 1844 | *Campbell, James, Esq. *Grove-house, Hendon, Middlesex; and* 8, *Park-street, Grosvenor-square, W.* |
| 1857 | 320 Campbell, James, Esq., Surgeon R.N. *Bangkok, Siam.* |
| 1834 | *Campbell, James, Esq., jun. *Hampton-court-green, S.W.* |
| 1863 | Campbell, Jas. Duncan, Esq. 8, *Norfolk-terrace, Westbourne-grove, W.* |
| 1857 | Camps, William, Esq., M.D. 40, *Park-street, Grosvenor-square, W.* |
| 1857 | Cannon, Lieut.-General P. |
| 1853 | *Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square, S.W.* |

| Year of Election | |
|---|---|
| 1863 | *Carew, R. Russell, Esq., J.P. *Carpender's-park, Watford, Herts; and Oriental Club, W.* |
| 1862 | Cargill, John, Esq., Member of the Legislative Assembly of New Zealand and Legislative Council of Otago. *Dunedin, Otago, New Zealand.* |
| 1863 | *Cargill, Wm. W., Esq. 4, *Connaught-place, Hyde-park, W.* |
| 1864 | Carmichael, Lieut. L. M. *Lucknow.* |
| 1865 | 330*Carnegie, David, Esq. *Eastbury, by Watford, Herts.* |
| 1863 | Carnegie, Capt. the Hon. J., R.N. *H.M.S. 'Salamander.'* |
| 1864 | Carrington, R. C., Esq. *Admiralty, W.* |
| 1861 | Carter, Captain Hugh Bonham, Coldstream Guards. *Guards' Club, S.W.; and 1, Carlisle-place, Victoria-street, S.W.* |
| 1860 | Cartwright, Capt. Henry, F.S.A. 13, *Gloucester-square, Hyde-park, W.* |
| 1857 | Cartwright, Col. Henry, Grenadier Guards, M.P. 1, *Tilney-street, Park-street, Grosvenor-square, W.* |
| 1860 | *Carver, the Rev. Alfred J., D.D., Master of Dulwich College. *Dulwich, S.* |
| 1858 | Casella, Louis P., Esq. 23, *Hatton-garden, E.C.; and South-grove, Highgate, N.* |
| 1860 | Cave, Amos, Esq. 109, *New-road, Kennington-park, S.; and Rathbone-place, Oxford-street, W.* |
| 1857 | Cave, Capt. Laurence Trent. 23, *Lowndes-street, Belgrave-square, S.W.* |
| 1858 | 340 Cave, Stephen, Esq., M.P. 35, *Wilton-place, S.W.* |
| 1863 | Challis, John Henry, Esq. *Reform Club, S.W.* |
| 1865 | Chambers, Charles Harcourt, Esq., M.A. 2, *Chesham-place, S.W.* |
| 1864 | Chambers, David, Esq. *Paternoster-row, E.C.* |
| 1858 | Champion, John Francis, Esq. *High-street, Shrewsbury.* |
| 1834 | *Chapman, Capt. John James, R.A., F.R.S. 33, *Adelaide-square, Bedford.* |
| 1860 | Charlemont, Lord. *Charlemont-house, Dublin.* |
| 1861 | Charnock, Richard Stephens, Esq. 8, *Gray's-inn-square, W.C.* |
| 1864 | Cheadle, Walter, Esq., B.A., M.B. Camb. 4, *Grosvenor-square, W.* |
| 1861 | Cheetham, John Frederick, Esq. *Eastwood, Stalybridge.* |
| 1855 | 350 Cheshire, Edward, Esq. *Conservative Club, S.W.* |
| 1838 | *Chesney, Major-General Francis Rawdon, R.A., D.C.L., F.R.S. *Athenæum Club, S.W.; and Ballygurdle, Down, Ireland.* |
| 1858 | Chetwode, Augustus L., Esq. 7, *Suffolk-street, Pall-mall-east, S.W.; and Chilton-house, Thame, Oxfordshire.* |
| 1858 | Childers, Hugh C. E., Esq., M.P. 17, *Prince's-gardens, W.; and Australia.* |
| 1856 | Childers, John Walbanke, Esq. *Cantley-hall, near Doncaster.* |
| 1857 | *Chimmo, Comm. William, R.N. |
| 1861 | Christian, Capt. Henry, R.N. *Commr. of the Royal Yacht, Portsmouth.* |
| 1854 | *Church, J. W., Esq., B.A. *United University Club, S.W.; and Woodside, Hatfield.* |
| 1830 | *Church, W. H., Esq. |
| 1849 | Churchill, Lord Alfred Spencer. 16, *Rutland-gate, S.W.* |
| 1856 | 360 Churchill, Charles, Esq. *Weybridge-park, Surrey.* |
| 1853 | Clarendon, George William, Earl of, K.G., G.C.B. 1, *Grosvenor-crescent, S.W. The Grove, Watford, Herts; and Hindon, Wilts.* |

| Year of Elect on. | | |
|---|---|---|
| 1863 | | Clark, Lieut. Alex. J. 14, *St. James's Square, S.W.; and Fresyell-house, Maudlen, Newport, Monmouthshire.* |
| 1852 | | Clark, Daniel, Esq. *Care of J. Littles, Esq., Millbank, near Devonport.* |
| 1840 | | *Clark, Sir James, Bart., M.D., F.R.S. *Bayshot-park, Surrey.* |
| 1862 | | Clark, Latimer, Esq. 1, *Victoria-street, Westminster, S.W.; and Cairo.* |
| 1859 | | Clarke, Capt. A., R.E. *Army and Navy Club, S.W.* |
| 1860 | | Clarke, Rev. Joseph W., D.D., Chaplain R.N. *H.M.S. 'Aretlusa.'* |
| 1855 | | *Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales.* |
| 1859 | | Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge.* |
| 1862 | 370 | Claude, Eugène, Esq. 22, *Park-road, Holloway, N.* |
| 1842 | | *Clavering, Sir William Aloysius, Bart., M.A. *United University Club, S.W.; Axwell-park, near Gateshead; and Greencroft, Durham.* |
| 1863 | | Clay, Sir Wm., Bart. *Eaton-square, S.W.* |
| 1863 | | Clayton, Capt. John W., late 15th Hussars. 14, *Portman-square, W.* |
| 1863 | | Clements, Rev. H. G. *United University Club, S.W.* |
| 1860 | | Clerk, Capt. Claude. *Mint-ary Prison Queen's Bench, Southwark, S.* |
| 1830 | | *Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh.* |
| 1858 | | Clermont, Thomas, Lord. *Ravensdale-park, Newry, Ireland.* |
| 1845 | | *Cleveland, His Grace the Duke of. 1, *Grosvenor-place-houses, S.W.* |
| 1861 | | Clifford, Sir Charles. *Cobham-hall, Suffolk.* |
| 1858 | 380 | Clifford, Charles Cavendish, Esq. *House of Lords, S.W.* |
| 1856 | | Clive, Rev. Archer. *Whitfield, Hereford.* |
| 1863 | | Clowes, E., Esq. *Reform Club, 105, Pall-mall, S.W.* |
| 1854 | | Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.; and Surbiton, Surrey.* |
| 1864 | | Clowes, Rev. George, B.A. *Surbiton, Surrey.* |
| 1854 | | Clowes, William, Esq. 51, *Gloucester-terrace, Hyde-park, W.* |
| 1861 | | Clowes, William Charles Knight, Esq., M.A. *Duke-street, Stamford-street, Blackfriars, S.; and Surbiton, Surrey.* |
| 1852 | | Cobbold, John Chevalier, Esq., M.P. *Athenæum Club, S.W.; and Ipswich, Suffolk.* |
| 1859 | | Cochrane, Capt. the Hon. A., R.N., C.B. *Junior United Service Club, S.W.* |
| 1862 | | Cockerton, Richard, Esq. 12, *Petersham-terrace, South Kensington, W.* |
| 1862 | 390 | *Cockle, George, Esq. 77, *Onslow-square, S.W.* |
| 1859 | | Cocks, Colonel C. Lygon, Coldstream Guards. *Treverbyn-Vean, near Liskeard.* |
| 1841 | | *Cocks, Reginald Thistlethwayte, Esq. 43, *Charing-cross, S.W.; and 22, Hertford-street, May-fair, W.* |
| 1857 | | Coghlan, Edward, Esq. *Training Institution, Gray's-inn-road, W.C.* |
| 1862 | | Coghlan, Major Gen. Sir William M., K.C.B., R.A. *Ramsgate, Kent.* |
| 1861 | | Coghlan, J., Esq., Engr.-in-Chief to the Government. *Buenos Ayres.* |
| 1838 | | Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Berkeley-square, W. and Kidbrooke, Sussex.* |
| 1841 | | *Colebrooke, Sir Thomas Edward, Bart., M.P., F.R.A.S. 37, *South-st., Park-lane, W.* |
| 1834 | | Colebrooke, Lt.-General Sir Wm., R.A., M.G., C.B., K.H., F.R.A.S. *Datchet, near Windsor; and United Service Club, S.W.* |

| Year of Election. | | |
|---|---|---|
| 1854 | | Coleman, Everard Home, Esq., F.R.A.S. *Registry and Record Office, Adelaide-place, London-bridge, E.C.* |
| 1848 | 400 | Coles, Charles, jun., Esq. 86, *Great Tower-street, E.C.* |
| 1835 | | *Collett, William Rickford, Esq. |
| 1858 | | Collinson, Henry, Esq. |
| 1855 | | Collinson, Rear-Admiral Richard, C.B. *Haven-lodge, Ealing, W.; and United Service Club, S.W.* |
| 1864 | | Colnaghi, Dominic E., Esq. 14, *Pall-mall-east, S.W.* |
| 1861 | | *Colville, Charles John, Lord. 42, *Eaton-place, S.W.* |
| 1861 | | Combe, Thomas, Esq., M.A. *University Press, Oxford.* |
| 1864 | | Commerell, Commr. J. E., R.N., V.C. *Aberbank, near Gosport.* |
| 1864 | | Conder, John, Esq. *Hallbrooke-house, New Wandsworth, N.W.* |
| 1861 | | Constable, Capt. Chas. Golding, I.N. 68, *Hamilton-ter., St. John's-wood, N.W.* |
| 1843 | 410 | *Cook, James, Esq. 40, *Mincing-lane, E.C.; and* 47, *Portland-place, W.* |
| 1859 | | Cooke, Major A. C., R.E. *Topographical Department, 4, New-street, Spring-gardens, S.W.* |
| 1863 | | *Cooke, E. W., Esq., A.R.A., F.R.S., F.L.S., F.G.S. *The Ferns, Kensington, W.* |
| 1856 | | Cooke, John George, Esq. 47, *Mount-street, Berkeley-square, W.* |
| 1860 | | Cooke, Nathaniel, Esq. 5, *Lulbrooke-terrace, Notting-hill, W.* |
| 1852 | | Cooke, Robt. F., Esq. 50, *Albemarle-street, W.; and* 38, *Nottingham-place, New-road, W.* |
| 1860 | | Cooke, William Henry, Esq., Barrister-at-Law. 4, *Elm-court, Temple, E.C.* |
| 1830 | | Cooley, William Desborough, Esq. 136, *Carlton-road, Kentish-town, N.W.* |
| 1862 | | Cooper, Sir Daniel. 20, *Prince's-gate, S.W.* |
| 1856 | | Cooper, Lt.-Col. Edward, Grenadier Guards. 5, *Bryanston-square, W.* |
| 1860 | 420 | Cooper, Lt.-Col. Joshua H., 7th Fusiliers. *Gibraltar.* |
| 1853 | | Coote, Charles Chidley, Esq. C4, *Albany, W.; and Mount-Coote, Limerick, Ireland.* |
| 1857 | | *Coote, Captain Robert, R.N. *Shales, Bittern, Southampton.* |
| 1862 | | Cope, Walter, late H.M.'s Chargé d'Affaires at the Equador. 14, *The Terrace, Camberwell, S.* |
| 1853 | | Copley, Sir Joseph William, Bart. *Sprotborough, Doncaster.* |
| 1863 | | Corbet, Richard, Esq. 41, *Portman-square, W.; and Adderley-hall, Shropshire.* |
| 1864 | | Cork and Orrery, Earl of. 1, *Grafton-street, W.* |
| 1865 | | Cornthwaite, Rev. T., M.A. *Forest, Walthamstow.* |
| 1860 | | Cornwell, James, Esq., PH. DR. *Loughborough-park-villa, Brixton, S.* |
| 1839 | | *Corrance, Frederick, Esq. *Parkham-hall, Wickham Market, Suffolk.* |
| 1856 | 430 | Costerton, John C., Esq. *Canton.* |
| 1853 | | *Cosway, William Halliday, Esq. *Oxford and Cambridge Club, S.W.* |
| 1863 | | Courtenay, L. W., Esq. *British Post-office, Constantinople.* |
| 1865 | | Cowan, John E., Esq. 27, *Prince's-square, Hyde-park, W.* |
| 1862 | | Coward, William, Esq. 5, *Park-villas, Lower Norwood, S.* |
| 1857 | | *Cowell, Major J. C., R.E. *Buckingham-palace, S.W.* |
| 1861 | | Cowell, John Jermyn, Esq. 41, *Gloucester-terrace, Hyde-park, W.* |

| Year of Election | |
|---|---|
| 1854 | Cowley, Norman, Esq. 4, *Montagu-place, Montagu-square, W.* |
| 1862 | Cowper, Sedgwick S., Esq. *Messrs. J. Clinch and Son, Abchurch-lane, E.C.* |
| 1862 | Cox, Edward William, Esq., Barrister-at-Law, Recorder of Falmouth. 1, *Essex-court, Temple, E.C.; and Moat-mount, Highwood, Middlesex.* |
| 1853 | 440 Craufurd, Captain Frederic A. B., R.N. *United Service Club, S.W.; and H.M.S. 'Egmont,' Rio.* |
| 1857 | Craufurd, Major-General James Robertson, Grenadier Guards. *Travellers' Club, S.W.; and 36, Prince's-gardens, W.* |
| 1857 | Crawford, James, Esq. *Brussa, Turkey.* |
| 1848 | Crawford, Robert Wigram, Esq., M.P. 71, *Old Broad-street, E.C.* |
| 1830 | Crawfurd, John, Esq., F.R.S. *Athenæum Club, S.W.; and 4, Elvaston-place, Queen's-gate, S.W.* |
| 1861 | Creswell, Rev. S. F., M.A. *The Grammar School, Lancaster.* |
| 1854 | *Creswell, Captain S. Gurney, R.N. *Lynn, Norfolk.* |
| 1856 | Croker, T. F. Dillon, Esq. 19, *Pelham-place, Brompton, S.W.* |
| 1864 | Croll, A. A., Esq., C.E. *Southwood, Southwood-lane, Highgate.* |
| 1860 | *Croskey, J. Rodney, Esq. 84, *King William-street, E.C.; and Warwick-house, Warwick-road, Paddington, W.* |
| 1860 | 450 Crosse, the Rev. Thomas, D.C.L., M.R.A.S. *Hastings.* |
| 1862 | Crossman, James Hiscutt, Esq. 24, *Norfolk-crescent, Hyde-park, W.* |
| 1863 | Crowder, Thos. Moseley, Esq., M.A. *Thornton-hall, Bedale, Yorkshire.* |
| 1852 | Crowdy, James, Esq. 17, *Serjeants'-inn, E.C.* |
| 1861 | Crowley, Jonathan Sparrow, Esq., C.E. *Sudbury, Middlesex, N.W.* |
| 1861 | Crukshank, David, Esq. *Avenue-place, Southampton.* |
| 1859 | Cull, Richard, Esq., F.S.A. 13, *Tavistock-street, Bedford-square, W.C.* |
| 1863 | Cumming, Sir Alex. G. *Altyre, Forres, N.B.* |
| 1857 | Cumming, William Fullarton, Esq., M.D. *Athenæum Club, S.W.; and Athol-crescent, Edinburgh.* |
| 1847 | *Cunard, Edward, Esq. 26, *Prince's-gardens, South Kensington, W.* |
| 1860 | 460 Cunliffe, Roger, Esq. 24, *Lombard-street, E.C.; and 10, Queen's-gate, South Kensington, W.* |
| 1864 | Cunningham, H. Esq. *Craven hill, W.* |
| 1853 | Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow, N.W.* |
| 1862 | *Cunynghame, Major-Gen. A. T., C.B. *Commanding Dublin Division, Royal Barracks, Dublin.* |
| 1865 | Cure, Capel, Esq. 51, *Grosvenor-street, W.* |
| 1843 | *Cursetjee, Manockjee, Esq., F.R.S.N.A. *Villa-Byculla, Bombay.* |
| 1839 | *Curtis, Timothy, Esq. |
| 1863 | Curzon, Hon. R. 24, *Arlington-street, W.; and Parham-park, Steyning, Sussex.* |
| 1864 | Dallas, A. G., Esq. 2, *Ennismore-place, Prince's-gate, S.W.* |
| 1863 | *Dalgety, Fred. G., Esq. 8, *Hyde-park-terrace, W.* |
| 1865 | 470 D'Almeida, W. B., Esq. *The Grange, West Molesey, Surrey.* |
| 1863 | Dalrymple, Donald, Esq. *Norwich.* |

| Year of Election | | |
|---|---|---|
| 1861 | | Dalrymple, F. Elphinstone, Esq., India Civil Service. *Albemarle-hotel, Albemarle-street, W.* |
| 1857 | | Dalton, D. Foster Grant, Esq. *Shanks-house, near Wincanton, Somerset.* |
| 1859 | | Dalyell, Sir Robt. Alex. Osborn, Bart. *H.M.'s Consul at Jassy; and Royal Hospital, Greenwich, S.E.* |
| 1862 | | Darvall, John Barly, Esq. |
| 1838 | | *Darwin, Charles, Esq., M.A., F.R.S. *Athenæum Club, S.W.; and Down, near Bromley, Kent.* |
| 1860 | | Dasent, John Bury, Esq. 22, *Warwick-road, Maida-hill, W.* |
| 1858 | | Davies, William, Esq. *West Indies.* |
| 1865 | | *Davis, Alfred, Esq. 69, *Houndsditch, E.C.; and Norfolk-hall, Norfolk-square, Hyde-park, W.* |
| 1858 | 480 | Davis, Dr. Francis William, Surgeon R.N. *H.M.S. 'Alert;' and Lurgamboy-house, Manor Hamilton, Ireland.* |
| 1861 | | Davis, Staff-Commander John Edward, R.N. *Hydrographic-office, Admiralty, S.W.* |
| 1846 | | Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenæum Club, S.W.; and Hollywood, near Bristol.* |
| 1840 | | *Dawnay, the Hon. Payan. *Beningborough-hall, Newton-upon-Ouse, Yorkshire.* |
| 1859 | | De Blaquiere, John, Lord. 9, *Stratford-place, W.* |
| 1852 | | De Bomville, Chev. Alexander, K.L.H. 25, *Newland-street, Kensington, W.* |
| 1858 | | De Bourgho, T. J., Esq. 6, *Charing-cross, S.W.* |
| 1856 | | De Crespigny, Lieut. C., R.N. |
| 1856 | | De Gex, William Francis, Esq. 25, *Thropmorton-street, E.C.* |
| 1853 | | De Grey and Ripon, George Frederick Samuel, Earl. 1, *Carlton-gardens, S.W.; and Studley Royal, Ripon.* |
| 1865 | 490 | De Laski, A., Esq. *Claryes-hotel, 45, Brook-street, W.* |
| 1862 | | Denham, Capt. Henry Mangles, R.N., C.B. 16, *Delamere-terrace, W.* |
| 1860 | | Denison, Alfred, Esq. 6, *Albemarle-street, W.* |
| 1834 | | *Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor of Madras.* |
| 1836 | | Denman, Rear-Admiral the Hon. Joseph. *Commander-in-Chief, Pacific; and 17, Eaton-terrace, S.W.* |
| 1833 | | *Derby, Edward Geoffrey, Earl of, P.C., F.L.S. 23, *St. James's-square, S.W.; and Knowsley-park, Prescott, Lancashire.* |
| 1854 | | *Devaux, Alexander, Esq. 2, *Avenue-road, Regent's-park, N.W.* |
| 1860 | | Devine, Thomas, Esq., Chief of Surveys. *Quebec, Upper Canada.* |
| 1837 | | *Devonshire, William Cavendish, Duke of, LL.D., D.C.L., M.A., F.R.S. *Devonshire-house, Piccadilly, W.; and Hardwicke-hall, Derbyshire.* |
| 1865 | | Dew, Capt. Roderick, C.B., R.A. *Army and Navy Club, S.W.; and St. James's-street, S.W.* |
| 1864 | 500 | Dick, A. H. Esq., M.A., *Roseland-house, Partick, near Glasgow.* |
| 1862 | | Dick, Capt. Charles Cramond. *Exeter, Devon.* |
| 1863 | | Dick, J. N., Esq., R.N. 2, *Clifton-gardens, Maida-hill, W.* |
| 1861 | | Dick, Robert Kerr, Esq., Bengal Civil Service. *Oriental Club, W.* |

Year of Election

1833 Dickenson, John, Esq., F.R.S., F.S.A. 39, *Upper Brook-street, W.; and Abbott's-hill, Hemel-Hempstead.*

1852 Dickenson, John, Esq., jun. *Clarence-chambers, 12, Haymarket, S.W.; and Abbott's-hill, Hemel-Hempstead.*

1854 *Dickenson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*

1860 Dickinson, Rev. C. S. Allen, B.A.

1830 *Dickinson, Francis Henry, Esq., F.S.A. 8, *Upper Harley-street, W.; and Kingweston-park, Somerset.*

1860 Dickinson, Jas. Austen, Esq. *County Surveyor's Office, Mullingar.*

1859 Dickson, A. Benson, Esq. *Chapel-stairs, Lincoln's-inn, W.C.*

1858 Dickson, Charles Hanmer, Esq. *H.B.M. Consul, Sukum Kalé, Black Sea.*

1860 Dickson, Lieut.-Col. Lothian Sheffield. 10, *Stanhope-terrace, Hyde-park, W.*

1843 Dickson, Peter, Esq. 28, *Upper Brook-street, W.*

1860 Dietz, Bernard, Esq., of Algoa Bay. 3, *Dorset-square, W.*

1859 Digby, G. Wingfield, Esq. *Sherborne-castle, Dorset.*

1830 Digby, Lieut.-Col. John Almerus. *Cholmington-house, Cattistock, Dorchester.*

1845 *Dilke, Sir Charles Wentworth, Bart., M.P. 76, *Sloane-street, S.W.*

1859 *Dilke, Charles Wentworth, Esq. 76, *Sloane-street, S.W.*

1856 Dillon, the Hon. Arthur. 17, *Clarges-street, W.*

1835 *Dillon, John, Esq. *Netley-Lodge, 31, Phillimore-gardens, Kensington, W.*

1864 Dimsdale, J. C., Esq. 50, *Cornhill, E.C.; and 52, Cleveland-square, S.W.*

1861 Dixon, Lieut.-Colonel John. 4, *Craig's-court, S.W.*

1854 Dixon, W. Hepworth, Esq., F.S.A. *Essex-villa, Queen's-road, St. John's-wood, N.W.*

1857 Dobie, John, Esq., R.N. *Junior United Service Club, S.W.; and Club-chambers, S.W.*

1857 Dobie, Robert, Esq., M.D., R.N. 7, *Houghton-place, Ampthill-square, Hampstead-road., N.W.*

1854 Dodson, John George, Esq., M.P. 6, *Seamore-place, Mayfair, W.*

1862 Dolben, Commr. Wm. Digby Mackworth, R.N. *H.M.S. 'Bloodhound,' W. Coast of Africa.*

1854 *Dollond, George, Esq. *St. Paul's-churchyard, E.C.*

1854 Domville, William T., Esq., M.D., R.N. *Army and Navy Club, S.W.*

1853 Donaldson, Sir Stuart A. 32, *Prince's-gardens, W.; and Sydney, Australia.*

1858 Donne, John, Esq. *Instow, North Devon.*

1861 Donoughmore, R. J. Hely-Hutchinson, Earl of. 52, *South Audley-street, W.; Knocklofty-house, Tipperary; and Palmerston house, near Dublin.*

1864 Doran, Dr. John, F.S.A. *Royal-crescent, Notting-hill, W.*

1850 Dover, John William, Esq. 124, *Fenchurch-street, E.C.*

1854 Dower, John, Esq. 108, *Fleet-street, E.C.*

1853 Doyle, Sir Francis Hastings C., Bart. *Custom-house, E.C.*

1845 *Drach, Solomon Moses, Esq., F.R.A.S. 39, *Houland-street, Fitzroy-square, W.*

1864 Drew, Major H. 14, *St. James's-square, S.W.*

1865 Drummond, E. A., Esq. 1, *Montagu-square, W.*

1846 Drummond, Lieut.-General John. *The Boyce, Dymock, Gloucestershire.*

| Year of Election | |
|---|---|
| 1846 | Drury, Capt. Byron, R.N. *The Thicket, Southsea.* |
| 1857 | Dublin, His Grace the Archbishop of. *Dublin.* |
| 1851 | *Du Cane, Major Francis, R.E. 64, *Lowndes-square, S.W.* |
| 1851 | *Ducie, Henry John, Earl, F.R.S. 30, *Prince's-gate, S.W.* |
| 1859 | Ducket, Clark A., Esq., M.D., Surgeon R.N. *H.M.S. 'Geyser;' and 5, Sefton-terrace, Great Yarmouth.* |
| 1859 | Duckworth, Henry, Esq. 2, *Gambier-terrace, Liverpool.* |
| 1860 | *Duff, Mountstuart Elphinstone Grant, Esq., M.P. 4, *Queen's-gate-gardens, South Kensington, W.* |
| 1865 | *Dufferin, Right Hon. Lord. *Dufferin-lodge, Fitzroy-park, Highgate, N.* |
| 1864 | Duke, Sir James, Bart. 43, *Portland-place, W.; and Laughton-lodge, Sussex.* |
| 1863 | Duncan, Capt. Francis, R.A., M.A., F.R.S. *The Citadel, Plymouth.* |
| 1861 | *Duncan, George, Esq. 45, *Gordon-square, W.C.* |
| 1840 | *Dundas, Right Hon. Sir David, Q.C., M.P. 13, *King's-Bench-walk, Temple, E.C.; and Ochtertyre, Stirling.* |
| 1860 | Dunell, Henry James, Esq. 4, *Upper Hyde-park-gardens, W.* |
| 1859 | *Dunlop, R. H. Wallace, Esq., C.B., Indian Civil Service. *Messrs. Grindlay and Co., Parliament-street.* |
| 1860 | *Dunmore, Charles Adolphus Murray, Earl of. 24, *Carlton-house-terrace, S.W.* |
| 1837 | *Dunraven, Edwin Richard, Earl of, F.R.S. *Adare-manor, Limerick; and Dunraven-castle, Glamorganshire.* |
| 1856 | Dupuat, Chevalier Alfredo. *H.M.F. Arbitrator, Cape Town, Cape of Good Hope.* |
| 1861 | Dupree, Thos. W., Esq., M.D. *Panama.* |
| 1852 | D'Urban, Colonel W. J. *Deputy Quartermaster-General, Canada; U. S. Club, S.W.; and Newport, near Exeter.* |
| 1864 | Dutton, F. S, Esq. *Reform Club, S.W.; and Adelaide, Australia.* |
| 1861 | Dyke, Commander Peche H., R.N. 3, *Southwick-place, Hyde-park, W.* |
| | |
| 1857 | Eardley, Sir E. G. Culling. *Belvedere, Erith.* |
| 1854 | Eardley-Wilmot, Capt. A. P., R.N., C.B. *H.M.S. 'Nile,' Queenstown.* |
| 1856 | Eardley-Wilmot, Col. F., M.R.A. *Shoebury Ness, Essex.* |
| 1865 | Easste, William, Esq. 11, *Park-road, Regent's-park, N.W.* |
| 1857 | Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park, W.* |
| 1863 | Eaton, F. A., Esq. *New University Club, St. James's-street, S.W.* |
| 1862 | *Eaton, H., Esq. 16, *Prince's-gate, Hyde-park, W.* |
| 1862 | *Eaton, Henry William, Esq., M.P. 16, *Prince's-gate, Hyde-park, W.* |
| 1864 | *Eaton, William Menton, Esq., 16, *Prince's-gate, Hyde-park, W.* |
| 1861 | Eber, General F. 33, *St. James's-square, S.W.* |
| 1862 | Ebury, Lord. 107, *Park-street, Grosvenor-square, W.; and Moor-park, Herts.* |
| 1862 | Eden, Rear-Adm. Charles. C.B. *Admiralty, S.W.; and 20, Wilton-place, S.W.* |
| 1858 | Edge, Rev. W. J., M.A. *Benenden-vicarage, near Staplehurst, Kent.* |
| 1863 | Edgeworth, M. P., Esq., BENG.C.S. *Mostrim-house, Anerly, S.* |
| 1861 | *Edwards, Henry, Esq. 53, *Berkeley-square, W.* |

| Year of Election | | |
|---|---|---|
| 1860 | | Edwards, Major James B., R.E. *Junior United Service Club, S.W.* |
| 1860 | | Egerton, Colonel the Hon. Arthur. 13, *Upper Belgrave-street, S.W.* |
| 1857 | | Egerton, Commander Charles Randell, R.N. 7, *Rutland-gate, S.W.* |
| 1853 | | Egerton, Captain the Hon. Francis, R.N. *Bridgwater-house, S.W.; and H.M.S. 'St. George.'* |
| 1863 | 580 | *Elder, George, Esq. *Knockenstie, Ayrshire.* |
| 1830 | | Elderton, Edward M., Esq. 40, *St. George's-road, Pimlico, S.W.* |
| 1865 | | Elias, Ney, Jun., Esq. 64, *Lancaster-terrace, Bayswater, W.* |
| 1862 | | Elkington, Lieut.-Col. J. H. F. *Army and Navy Club, S.W., and Park-street, Bath.* |
| 1845 | | Ellenborough, Edward, Earl of, G.C.B. 110, *Eaton-square, S.W.; and Southam-house, near Cheltenham.* |
| 1863 | | Ellerton, John L., Esq. 6, *Connaught-place, Hyde-park, W.* |
| 1860 | | Elliot, George, Esq., C.E. *The Hall, Houghton-le-Spring, near Fence Houses, Durham.* |
| 1857 | | *Elliot, Capt. L. R. *La Meilleraye-sur-Seine, Seine Inférieure.* |
| 1830 | | *Elliott, Rev. Charles Boileau, M.A., F.R.S. *Lattingstone, Suffolk.* |
| 1861 | | Ellis, Rev. William. *Madagascar.* |
| 1865 | 590 | Ellis, W. E. H., Esq. *Hasfield-court-y, Gloucester; Oriental Club, W.; and Byculla Club, Bombay.* |
| 1858 | | Elphinstone, Major Howard C., R.E. *Buckingham-palace, S.W.* |
| 1857 | | Elton, Sir Arthur H., Bart. *Athenæum Club, S.W.; and Clevedon-court, Somersetshire.* |
| 1862 | | *Emanuel, Harry, Esq. 8, *Clarence-terrace, Regent's-park, N.W.* |
| 1863 | | Emslie, John, Esq. 47, *Gray's-inn-road, W.C.* |
| 1830 | | Enderby, Charles, Esq., F.R.S., F.L.S. 13, *Great St. Helen's, E.C.* |
| 1860 | | Enfield, Edward, Esq., F.S.A. 19, *Chester-terrace, Regent's-park, N.W.* |
| 1863 | | Engleheart, Gardner D., Esq. 1, *Eaton-place-south, S.W.* |
| 1856 | | Entwisle, John, Esq. 1, *Russell-square, W.C.* |
| 1861 | | Erroll, William Harry Hay, Earl of. 3, *Grafton-street, W.; Pembroke-lodge, Richmond-park, S.W.; and Slains-castle, Aberdeenshire.* |
| 1852 | 600 | Erskine, Vice-Admiral John Elphinstone, M.P., C.B. *H.M.S. 'Edgar;' 1 L, Albany, W., and Cardross, Stirling, N.B.* |
| 1857 | | *Esmeade, G. M. M., Esq. 29, *Park-street, Grosvenor-square, W.* |
| 1850 | | Espinasse, Major J. W., 12th Regt. |
| 1857 | | Evans, F. J., Esq., Staff Commander, R.N., F.R.S., F.R.A.S. 4, *Wellington-terrace, Charlton, Blackheath, S.E.* |
| 1830 | | *Evans, Vice-Admiral George. 1, *New-street, Spring-gardens, S.W.; and Englefield-green, Chertsey.* |
| 1857 | | Evans, Thos. Wm., Esq., M.P. 1, *Dartmouth-street, Westminster, S.W.; and Allestree-wall, Derby.* |
| 1830 | | *Evans, W. Esq. |
| 1861 | | Evelyn, Lieut.-Colonel George P. 4, *Onslow-crescent, Brompton, S.W.* |
| 1851 | | *Evelyn, William J., Esq., F.S.A. *Evelyn Estate Office, Evelyn-street, Deptford.* |

| Year of Election | |
|---|---|
| 1845 | *Everest, Sir Geo., Bengal Art., K.C.B., F.R.S., &c. 10, *Westbourne-street, Hyde-park, W.* |
| 1830 | 610*Everett, James, Esq., F.S.A. |
| 1865 | Everitt, George A., Esq. *Oakfield, Moseley, near Birmingham.* |
| 1859 | Ewart, William, Esq., M.P. 6, *Cambridge-square, W.* |
| 1856 | Ewing, J. D. Crum, Esq. 21, *Birchin-lane, E.C.* |
| 1857 | Eyre, Edward J., Esq., Lt.-Gov. of Antigua. |
| 1861 | Eyre, George E., Esq. 39, *Lowndes-square, Brompton, S.W.* |
| 1856 | Eyre, M.-Gen. Vincent, C.B. *Athenæum Club, S.W.; and* 60, *Cumberland-terrace, Hyde-park, W.* |
| 1861 | Fairbairn, William, Esq., C.E., F.R.S. *Manchester.* |
| 1856 | Fairholme, George Knight, Esq. *Union Club, S.W.; and Ravenswood, Melrose, N.B.* |
| 1838 | Falconer, Thomas, Esq. *Usk, Monmouthshire.* |
| 1857 | 620 Falkland, Lucius Bentinck, Viscount. *Skutterskelfe, Yorkshire.* |
| 1855 | *Fanshawe, Admiral E. G. 63, *Eaton-square, S.W.* |
| 1863 | *Farrer, W. Jas., Esq 24, *Bolton-street, Piccadilly, W.* |
| 1864 | Faulkner, Charles, Esq. *Beddington, Oxford.* |
| 1863 | *Faunthorpe, J. P., Esq. *Training College, Battersea.* |
| 1853 | *Fayrer, Joseph, Esq., M.D. *Calcutta.* |
| 1858 | Fazakerley, J. N., Esq. 17, *Montagu-street, Portman-square, W.* |
| 1864 | Fergurson, J., Esq. *Western Club, Glasgow.* |
| 1856 | Ferguson, William, Esq. 2, *St. Aidan's-terrace, Birkenhead.* |
| 1863 | Fergusson, Alex., Esq. *Champion-hill, Camberwell, S.* |
| 1840 | 630*Fergusson, James, Esq., F.R.A.S. 20, *Langham-place, W.* |
| 1860 | Ferro, Don Ramon de Silva, Chilian Consul General. 43, *Moorgate-street, E.C.* |
| 1830 | Findlay, Alexander, Esq. *Hayes, Kent, S.E.* |
| 1844 | Findlay, Alex. George, Esq. 53, *Fleet-street, E.C.; and Hayes, Kent, S.E.* |
| 1862 | Finnis, Thomas Quested, Esq., Alderman. *Wanstead, Essex, N.E.* |
| 1859 | Fisher, Anthony L., Esq., M.D. 14, *York-place, Baker-street, Portman-square, W.* |
| 1863 | Fisher, John, Esq. 60, *St. James's-street, S.W.* |
| 1859 | Fisher, Robert, Esq. 15, *George-street, Hanover-square, W.* |
| 1857 | *Fitzclarence, Commander the Hon. George, R.N. |
| 1863 | Fitzgerald, J. F. V., Esq. 11, *Chester-square, S.W.* |
| 1861 | 640 Fitzgerald, Captain Keane. 2, *Portland-place, W.* |
| 1860 | Fitzmaurice, Lieut. the Hon. Frederick. |
| 1864 | Fitz-Patrick, Lieut. Francis Skelton, 42nd Regt. Madras Army. 7, *Richmond-terrace, Westminster, W.* |
| 1859 | *Fitz-Roy, George Henry, Esq. *Downshire-house, Rockingham.* |
| 1857 | Fitzwilliam, the Hon. C. W., M.P. *Brooks's Club, St. James's-street, S.W.* |
| 1837 | *Fitzwilliam, William Thomas, Earl. 4, *Grosvenor-square, W.; and Wentworth-house, Rotherham, Yorkshire.* |
| 1865 | *Fitzwilliam, Wm. S. Esq. 28, *Onslow-square, Brompton, S.W.* |
| 1863 | Fleming, G., Esq. *South Camp, Aldershot.* |

| Year of Election | | |
|---|---|---|
| 1861 | | *Fleming, John, Esq. 18, *Leadenhall-street, E.C.* |
| 1865 | | Fleming, Rev. T. S. *Retford, Notts.* |
| 1853 | 650 | *Flemyng, Rev. Francis P. *Glenfeulin, near Helensburgh, Glasgow.* |
| 1862 | | Fletcher, John Charles, Esq. *Dale-park, Arundel: and Ebury-place, S.W.* |
| 1857 | | Fletcher, Thomas Keddey, Esq. *Union-dock, Limehouse, E.* |
| 1864 | | Flower, Capt. L. 19, *Great George-street, S.W.; Binstead, Surrey; and Queen's United Service Club, S.W.* |
| 1863 | | Foley, Col. the Hon. St. George, C.B. |
| 1861 | | Foord, John Bromley, Esq. 52, *Old Broad-street, E.C.* |
| 1860 | | Forbes, Commander Charles S., R.N. *Army and Navy Club, S.W.* |
| 1863 | | Forbes, Lieut. C. J. F. Smith. *Cappoquin, Co. Waterford, Ireland.* |
| 1860 | | Forbes, the Hon. Horace Courtenay, M.A. *Oriel College, Oxford.* |
| 1845 | | Forster, Rev. Charles, B.D. *Stisted-rectory, Essex.* |
| 1839 | 660 | *Forster, William Edward, Esq., M.P. *Burley, near Otley.* |
| 1861 | | Forsyth, William, Esq., M.P., Q.C. 61, *Eaton-place, S.W.* |
| 1864 | | Fort, Richard, Esq., M.P. *Rodwell, Weymouth, Lancashire: and 24, Queen's-gate-gardens, South Kensington, W.* |
| 1858 | | Fortescue, Chichester S., Esq., M.P. 7, *Carlton-gardens, S.W.* |
| 1861 | | *Fortescue, Hon. Dudley F., M.P. 9, *Hertford-street, W.* |
| 1864 | | Fortune, C. F., Esq. *Trinidad, West Indies.* |
| 1864 | | Foster, Capt. W. J. *Stubbin Ing-house, Fryerham, Herts.* |
| 1864 | | Foster, H. J., Esq. |
| 1863 | | Fowler, J. T., Esq. *Government Inspector of Schools, Adyar, Madras, India.* |
| 1850 | | *Fowler, Robert N., Esq., M.A. 50, *Cornhill, E.C.; and Tottenham, N.* |
| 1861 | 670 | Fox, Arthur Douglas, Esq., C.B. 20, *Charles-street, Mayfair, W.; and 8, New-street, Spring-gardens, S.W.* |
| 1859 | | Fox, Lieut.-Colonel A. Lane. *Assistant Quartermaster-General, Cork.* |
| 1830 | | *Fox, Lieut.-General C. R. *Travellers' Club, S.W.; and 1, Addison-road, Kensington, W.* |
| 1864 | | *Fox, F. E. Esq. *Tottenham, Middlesex.* |
| 1860 | | Fox, Thos., Esq., M.D. *Inspector-General of Hospitals, North Camp, Aldershot.* |
| 1861 | | Franklin, Joseph Lewis, Esq. *Royal Thames Yacht Club, 7, Albemarle-street, W.* |
| 1865 | | *Franks, Aug. W., Esq. 55, *Upper Seymour-street, W.* |
| 1860 | | Franks, Charles W., Esq. |
| 1854 | | Fraser, Charles, Esq. 54, *Upper Hyde-park-gardens, W.* |
| 1862 | | Fraser, Com. H. A., R.N. |
| 1860 | 680 | Fraser, Thos., Esq. *Literary Sec., Hudson Bay Co., Hudson-bay-house, E.C.* |
| 1860 | | Freeman, Daniel Alex., Esq., Barrister-at-law. 1, *Pump-court, Temple, E.C.* |
| 1852 | | Fremantle, Vice-Admiral Sir Charles Howe, K.C.B. 57, *Grosvenor-street, Grosvenor-square, W.* |
| 1863 | | Fremantle, Commander Edmund Robert, R.N. 4, *Upper Eccleston-street, S.W.* |
| 1856 | | Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, *Upper Eccleston-street, Belgrave-square, S.W.* |
| 1864 | | Fremantle, Lieut.-Col. *Guards' Club, S.W.* |

| Year of Election | | |
|---|---|---|
| 1864 | | Freme, Major James H. *Wreatall-house, Shropshire; and Army and Navy Club, S.W.* |
| 1852 | | French, Dr. James, C.B. *Inspector-General of Hospitals, Graham's-hotel, Edinburgh.* |
| 1850 | | Frere, Bartle John Laurie, Esq. 45, *Bedford-square, W.C.* |
| 1839 | | *Frere, George, Jun., Esq. *Cape of Good Hope; and* 45, *Bedford-square, W.C.* |
| 1842 | 690 | Frere, William Edw., Esq., F.R.A.S. *Bombay; and* 45, *Bedford-square, W.C.* |
| 1853 | | Frith, John Griffith, Esq. 15, *Wimpole-street, W.; and* 11, *Austin Friars, E.C.* |
| 1859 | | Fryer, William, Esq. 39, *Marlborough-road-gardens, St. John's-wood, N.W.* |
| 1863 | | Fudge, William, Esq. 5, *Park-row, Bristol.* |
| 1855 | | Fuller, John, Esq. |
| 1865 | | Fuller, Thomas, Esq. 119, *Gloucester-place, Hyde-park, W.* |
| 1860 | | Fussell, Rev. J. G. Curry. 16, *Cadogan-place, S.W.* |
| 1861 | | Fynes Clinton, Rev. Charles J., M.A. 39, *Bedford-square, W.C.; and Cromwell, Notts.* |
| 1863 | | *Gabrielli, Antoine, Esq. 6, *Queen's-gate-terrace, Kensington, W.* |
| 1858 | | Gaisford, Thomas, Esq. *Travellers' Club, S.W.* |
| 1851 | 700 | Gallagher, John, Esq., M.D. *Reform Club, S.W.; and* 109, *Westbourne-terrace, W.* |
| 1855 | | *Galloway, John James, Esq. |
| 1848 | | *Galton, Capt. Douglas, R.E. 12, *Chester-street, Grosvenor-place, S.W.* |
| 1850 | | *Galton, Francis, Esq., M.A., F.R.S. 42, *Rutland-gate, S.W.; and* 5, *Bertie-terrace, Leamington.* |
| 1854 | | *Gammell, Major Andrew. *Dromtochty, Kincardineshire, N.B.* |
| 1859 | | Gammie, George, Esq. *Shotover-house, Wheatley, Oxon.* |
| 1861 | | Garden, Robert Jones, Esq. 63, *Montagu-square, W.* |
| 1865 | | Gardner, Capt., G. H., R.N. *Coast-Guard Office, Spring-gardens, S.W.* |
| 1863 | | Gardyne, D. J. B., Esq. *Trinity College, Oxford.* |
| 1863 | | Gascoigne, Frederic, Esq. *Parlington, Yorkshire.* |
| 1859 | 710 | *Gassiot, John P., Jun., Esq. 6, *Sussex-place, Regent's-park, N.W.* |
| 1838 | | *Gawler, Colonel George, K.H. *United Service Club, S.W.; and Southsea Villa, Southsea.* |
| 1865 | | George, H. B., Esq. 63, *Lincoln's-inn-fields, W.C.* |
| 1859 | | Gerstenberg, Isidore, Esq. 11, *Warnford-court, Throgmorton-street, E.C.* |
| 1865 | | *Gibbons, John S., Esq., Alderman. 13, *Upper Bedford-place, Russell-sq., W.C.* |
| 1859 | | *Gibbs, H. Hucks, Esq. *St. Dunstan's, Regent's-park, N.W.* |
| 1864 | | Gibson, A., Esq. *Achinreoch, Brechin, N.B.* |
| 1857 | | Gilchrist, John, Esq. 48, *Porchester-terrace, W.* |
| 1855 | | Gillespie, Alexander, Esq. *Heathfield, Hersham, Esher, Surrey.* |
| 1857 | | Gillespy, Thomas, Esq. *Brabant-court, Philpot-lane, E.C.* |
| 1863 | 720 | *Gillett, William, Esq. 6, *Albany, W.* |
| 1861 | | Gillat, Alfred, Esq. *Longham-house, near Wimborne, Dorset.* |
| 1853 | | Gillies, Robert, Esq., C.L. *Dunedin, Otago, New Zealand.* |

| Year of Election | | |
|---|---|---|
| 1863 | | Gladdish, Col. William. *Bydliffe's, Gravesend.* |
| 1864 | | Gladstone, George, Esq. *The Terrace, Clapham-common, S.* |
| 1863 | | Gladstone. J. H., Esq. 28, *Pembridge-gardens, W.* |
| 1862 | | *Gladstone, Robert Stuart, Esq. 11, *New Broad-street, E.C.* |
| 1846 | | *Gladstone, William, Esq. 57½, *Old Broad-street, E.C.* |
| 1864 | | Gladstone. W. K., Esq. *Fitzroy-park, Highgate, N.* |
| 1860 | | Glascott, Commander Adam Gifford, R.N., Acting Commissioner on the Turko-Persian Frontier. *Messrs. Chad. 3, Clifford's Inn, Fleet-street, E.C.* |
| 1857 | 730 | Gleig, Rev. G. R., M.A. *Chaplain-General, Chelsea-hospital, S.W.* |
| 1854 | | Glen, Joseph, Esq., Mem. Geogr. Soc. of Bombay. *Oriental Club, W.* |
| 1857 | | Glover, Commr. John H., R.N. *Lagos; and Army and Navy Club, S.W.* |
| 1860 | | Glyn, Capt. H. Carr, R.N. 1, *Eccleston-street, Belgrave-square, S.W.* |
| 1864 | | Glyn, R. C., Esq. *Army and Navy Club, S.W.* |
| 1864 | | Glyn, Sir Richard. *Army and Navy Club, S.W.* |
| 1862 | | Goddard, James, Jun., Esq. 14, *Mincing-lane, E.C.* |
| 1858 | | Goldsmid, Frederick D., Esq., M.P. 20, *Portman-square, W.* |
| 1863 | | Goldsmid, Lt.-Colonel Frederick John. *Harrow-on-the-hill; Southborough, Kent; and United Service Club, S.W.* |
| 1861 | | Goldsmid, Julian, Esq. 20, *Portman-square, W.* |
| 1860 | 740 | Gooch, Thomas Longridge, Esq. 101, *Lancaster-terrace, Bayswater, W.* |
| 1864 | | Goodall, George, Esq. |
| 1863 | | *Goodenough, Capt. J. G., R.N. *Junior U. S. Club, S.W.* |
| 1864 | | *Goodenough, Major W., R.A. *Staff-college, Sandhurst, Farnborough Stat., Hants.* |
| 1861 | | Gooldin, Joseph, Esq. 48, *Upper Hyde-park-gardens, W.* |
| 1856 | | Gordon, Alexander, Esq., C.E. 2, *Vincent-square, Westminster, S.W.* |
| 1856 | | Gordon, Colonel the Hon. Alexander H., C.B. |
| 1860 | | Gordon, the Honourable Arthur. |
| 1858 | | Gordon, Capt. Charles G., R.E. *Hong-Kong, China.* |
| 1860 | | Gordon, Rev. Cosmo Reid, M.A., F.S.A. 9, *Greendall-st., Greenheys, Manchester.* |
| 1854 | 750 | Gordon, Harry George, Esq. 1, *Clifton-place, Hyde-park-gardens, W.; and Kilmachussi, Dunkeld, Perthshire.* |
| 1856 | | Gordon, Admiral the Honourable John. 28, *Queen Anne-street, W.* |
| 1853 | | Gordon, Vice-Admiral Robert. *United Service Club, S.W.* |
| 1853 | | Gore, Richard Thomas, Esq. 6, *Queen-square, Bath.* |
| 1853 | | Gorman, John, Esq., M.D. 39, *Harewood-square, N.W.* |
| 1859 | | Gosling, Fred. Solly, Esq. 18, *New-street, Spring-gardens, S.W.* |
| 1862 | | Goss, Samuel Day, Esq., M.D. 111, *Kennington-park-road, S.* |
| 1835 | | Gould, Lieut.-Colonel Francis A. *Bentmyford, Herts.* |
| 1846 | | Gould, John, Esq., F.R.S., F.L.S. 26, *Charlotte-street, Bedford-square, W.C.* |
| 1860 | | Gould, Nathaniel, Esq., F.S.A. 4, *Tavistock-square, W.C.* |
| 1858 | 760 | Graham, Cyril C., Esq. 9, *Cleveland-row, St. James's, S.W.; and Debroe-house, Watford, Herts.* |
| 1861 | | Grant, Alexander, Esq. *Oakfield House, Hornsey, N.* |

| Year of Election | |
|---|---|
| 1861 | Grant, Daniel, Esq. 11, *Warwick-road, Upper Clapton, N.* |
| 1860 | Grant, Capt. James A. *E. India U. S. Club, S.W.; and Dingwall, Rosshire, N.B.* |
| 1861 | Grant, Colonel W. L., care of Capt. Ellis, *Army and Navy Club, S.W.* |
| 1860 | Grantham, Capt. James, R.E. *Scawby, Brigg, Lincolnshire; and Royal Engineer Office, Devonport.* |
| 1830 | *Gray, John Edw., Esq., PH.DR., F.R.S., Z.S. and L.S. *British Museum, W.C.* |
| 1862 | Greathed, Lieut.-Colonel Wilberforce, W. H., C.B. *Horse Guards, Whitehall, S.W.* |
| 1863 | Greaves, Rev. Richard W., rector of Tooting. *Tooting, S.* |
| 1861 | Green, Capt. Francis. 89, *Eccleston-square, S.W.* |
| 1830 | 770 Greene, Thomas, Esq. *Whittington-hall, near Burton, Westmoreland.* |
| 1857 | *Greenfield, W. B., Esq. 59, *Porchester-terrace, Hyde-park, W.; and Union Club, S.W.* |
| 1865 | Greg, W. R., Esq., Comptroller of H.M.S. Stationery Office. *Wimbledon, S.W.* |
| 1858 | Gregory, Charles Hutton, Esq., C.E. 1, *Delahay-street, Westminster, S.W.* |
| 1860 | *Gregory, Francis Thomas, Esq. *Queensland.* |
| 1858 | *Gregory, Isaac, Esq. *Chorlton-hall, Victoria-park, Manchester.* |
| 1857 | *Grellet, Henry Robert, Esq. *Savage-gardens, Tower-hill, E.C.* |
| 1859 | Grenfell, Chas. Pascoe, Esq. 38, *Belgrave-square, S.W.* |
| 1865 | Grenfell, Henry R., Esq., M.P. 15, *St. James's-place, S.W.* |
| 1858 | Grenfell, Pascoe St. Leger, Esq. *Maesteg-house, Swansea.* |
| 1853 | 780 Grenfell, Riversdale W., Esq. 27, *Upper Thames-street, E.C.* |
| 1830 | *Greswell, Rev. Richard, M.A., F.R.S. 39, *St. Giles, Oxford.* |
| 1837 | *Grey, Sir George, K.C.B. *Governor and Commander-in-Chief, New Zealand.* |
| 1844 | *Grey, Ralph Wm., Esq., Commissioner of Customs. 47, *Belgrave-square, S.W.; and Chipchase-castle, Hexham.* |
| 1864 | Grierson, Charles, Esq. 69, *St. James's-street, S.W.* |
| 1862 | Griffin, James, Esq. *The Hard, Portsea; and Cosham, Hants.* |
| 1861 | *Griffith, Daniel Clewin, Esq. 20, *Gower-street, W.C.* |
| 1839 | Griffith, John, Esq. 16, *Finsbury-place-south, E.C.* |
| 1863 | Griffith, Sir Richard. 29, *Eccleston-square, S.W.* |
| 1836 | Griffith, Richard Clewin, Esq. 20, *Gower-street, W.C.* |
| 1859 | 790 Grimston, the Hon. and Rev. Francis S. *Wakes Colne, Halstead.* |
| 1855 | Grindrod, R. B., Esq., M.D., LL.D., F.L.S., &c. *Townsend-house, Malvern.* |
| 1864 | Grinnell, C., Esq. *Burlington-chambers, 180, Piccadilly, W.* |
| 1861 | Grosvenor, Lord Richard, M.P. 33, *Upper Grosvenor-street, W.* |
| 1858 | Grote, George, Esq. 12, *Savile-row, W.* |
| 1857 | Grueisen, Charles Lewis, Esq. 16, *Surrey-street, Strand, W.C.* |
| 1862 | Gunn, F. L. G., Esq., M.D., Army Medical Staff. *Bathurst, Gambia, W. Africa; and 346, Bath-crescent, Glasgow.* |
| 1861 | Gunnell, Commander Edmund H., R.N. *Army and Navy Club, S.W.*; 21, *Argyll-road, Campden-hill, W.* |
| 1859 | *Gurney, John H., Esq. *Catton-hall, Norwich.* |

| Year of Election | | |
|---|---|---|
| 1857 | | Gurney, Samuel, Esq., M.P. 25, *Prince's-gate, Hyde-park, S.W.; and Carshalton, Surrey.* |
| 1862 | 800 | Guthrie, James Alexander, Esq. 30, *Portland-place, W.* |
| 1863 | | Hadfield, Wm., Esq., Secretary to the Buenos Ayres Railway Company. 11, *Inverness-road, Bayswater, W.* |
| 1863 | | Hadow, P. D., Esq. *Sudbury-priory, Middlesex.* |
| 1860 | | Haliday, Lieut.-Colonel William Robert. *United Service Club, S.W.* |
| 1853 | | *Halkett, Rev. Dunbar S. *Little Bookham, Surrey.* |
| 1853 | | *Halkett, Lieut. Peter A., R.N. *Windham Club, S.W.* |
| 1861 | | Hall, Charles Hall, Esq. 54, *Portland-pl., W.; and Watergate, near Emsworth.* |
| 1863 | | Hall, Henry, Esq. 109, *Victoria-street, S.W.* |
| 1862 | | Hall, James Tebbutt, Esq. *Fore-street, Limehouse, E.* |
| 1863 | | Hall, Thomas F., F.C.S. 29, *Warwick-square, S.W.* |
| 1853 | 610 | Hall, Admiral William Hutcheson, C.B., F.R.S. *United Service Club, S.W.; and* 48, *Phillimore-gardens, Kensington W.* |
| 1864 | | Halliday, Sir Fred., K.C.B. 28, *Cleveland-square, Hyde-park, W.* |
| 1856 | | Halloran, Alfred L., Esq., Staff Comm. 3, *Navy-terr., Torpoint, nr. Devonport.* |
| 1858 | | Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Heavitree, Exeter.* |
| 1862 | | Hamilton, Archibald, Esq. *South Barrow, Bromley, Kent, S.E.* |
| 1861 | | Hamilton, Lord Claude, M.P. 19, *Eaton-sq., S.W.; and Baronscourt, Co. Tyrone.* |
| 1830 | | *Hamilton, Capt. Henry G., R.N. 71, *Eccleston-square, S.W.* |
| 1861 | | Hamilton, Col. Robert William, Grenadier Guards. 18, *Eccleston-square, S.W.* |
| 1863 | | Hamilton, R., Esq. *Clerk of J. Foster Hamilton, Esq.*, 2, *Gloucester-street, Portman-square, W.* |
| 1830 | | Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.* |
| 1846 | 820 | Hamilton, Rear-Admiral W. A. Pailhe. *Mountney-house, Blackheath, S.E.* |
| 1837 | | Hamilton, Wm. John, Esq., F.R.S. 23, *Chesham-place, S.W.* |
| 1862 | | *Hanbury, Robert, Esq., M.P. 10, *Upper Grosvenor-street, W.* |
| 1853 | | *Hand, Capt. George S., R.N., C.B. *United Service Club, S.W.; and H.M.S. 'Victory.'* |
| 1860 | | *Handley, Benjamin, Esq., Assistant-Commr. Turko-Persian Frontier. *British Embassy, St. Petersburg; and* 27, *Essex-street, Strand, W.C.* |
| 1861 | | *Hankey, Blake Alexander, Esq. 38, *Portland-place, W.* |
| 1857 | | Hankey, Thomson, Esq., M.P. 45, *Portland-place, W.* |
| 1837 | | *Hanmer, Sir J., Bart., M.P., F.R.S. *Hanmer-hall and Bettisfield-park, Flintshire.* |
| 1859 | | *Hansard, Henry, Esq. 13, *Great Queen-street, W.C.* |
| 1840 | | *Harcourt, Egerton V., Esq. *Whitwell-hall, York.* |
| 1864 | 830 | *Hardie, Gavin, Esq. 113, *Piccadilly, W.* |
| 1864 | | Harding, Charles, Esq. *Grafton Club, 10, Grafton-street, Piccadilly, W.* |
| 1864 | | Harding, J. J., Esq. 1, *Barnsbury-park, Islington, N.* |
| 1864 | | Hardinge, Capt. E., R.N. 32, *Hyde-park-square, W.* |

| Year of Election | | |
|---|---|---|
| 1861 | | Hardinge, Henry, Esq., M.D. 18, *Grafton-street, Bond-street, W.* |
| 1862 | | Hardman, William, Esq., M.A. *Norbiton-hall, Kingston-on-Thames.* |
| 1864 | | Hardwicke, B. Esq. 43, *Russell-square, W.C.* |
| 1855 | | Harris, Archdeacon the Hon. C. A. *Bremhill-vicarage, Chippenham.* |
| 1853 | | Harris, Admiral the Hon. E. A. J., C.B. *H.B.M.'s Envoy Extraordinary and Minister Plenipotentiary, Legation Britannique, Berne.* |
| 1852 | | Harris, George Frederick, Esq., M.A. *Harrow-park, Middlesex, N.W.* |
| 1859 | 840 | Harris, Capt. Henry, H.C.S. 35, *Gloucester-terrace, Hyde-park, W.* |
| 1865 | | Harris, John M., Esq. 12, *Holland-terrace, Holland-road, Kensington, W.* |
| 1853 | | Harrison, Chas., Esq. *Laurie-park, Sydenham; and 3, Gt. Tower-st., E.C.* |
| 1859 | | Harrison, C. H. Rogers, Esq., F.R.C.S. 13, *Lansdowne-road, Clapham-road, S.* |
| 1838 | | Harrowby, Dudley, Earl of. *Sandon-ho., Lichfield; and Norton, Gloucestershire.* |
| 1863 | | Hart, Percy M., Esq. 5, *Bonfield-road, Clapham-road, S.* |
| 1854 | | *Hartland, Frederick D., Esq., F.S.A., &c. *The Oakhouls, near Cheltenham.* |
| 1863 | | Harvey, Charles, Esq. *Rathgate-cottage, Streatham, S.* |
| 1864 | | Harvey, John, Esq. *Ickwell Bury, Biggleswade.* |
| 1864 | | Harvey, John, Esq. 7, *Mansion-house, E.C.* |
| 1864 | 850 | Harvey, W. D., Esq. 52, *Nottingham-square, S.W.* |
| 1846 | | Harvey, W. S., Esq., R.N. *H.M.S. 'Hannibal,' Mediterranean; and* 14, *Great George-street, S.W.* |
| 1865 | | Harvey, C. H., Esq., M.D. 17, *Whitehall-place, S.W.* |
| 1859 | | Harwood, H. Harwood, Esq. 29, *Cleveland-square, Hyde-park, W.* |
| 1858 | | Hawker, Edward J., Esq. 37, *Cadogan-place, S.W.* |
| 1834 | | Hawkins, Francis Bisset, Esq., M.D., F.R.S. 29, *Upper Harley-street, W.; and Lencil-lodge, Dorchester.* |
| 1857 | | Hawkins, Capt. Frank K., R.N. *Army and Navy Club, S.W.* |
| 1840 | | *Hawkins, John, Esq. |
| 1858 | | *Hawkins, Col. J. Summerfield, R.E. *Woolwich, S.E.* |
| 1861 | | Hawksley, Thomas, Esq., C.E. 14, *Phillimore-gardens, Kensington, S.W.* |
| 1830 | 860 | Haworth, Frederick, Esq. 9, *Eccleston-street, S.W.* |
| 1852 | | *Hay, Capt. Sir J. C. Dalrymple, Bart., R.N. *U. S. Club, S.W.; Dunrozit, Glenluce; and Hurworth-on-the-hill, N.W.* |
| 1863 | | *Hay, Lord John. 15, *Cromwell-road, South Kensington, W.* |
| 1865 | | Hay, Lord William, M.P. 2, *Cleveland-row, S.W.* |
| 1859 | | Hay, Major W. E. *Care of Lady Mary Hay, Linden-lodge, Loan-head, near Edinburgh.* |
| 1864 | | Haysman, James, Esq. *Burdett-house, Burdett-road, E.* |
| 1862 | | Head, Alfred, Esq. 13, *Craven-hill-gardens, Bayswater, W.* |
| 1865 | | Headlam, Right Hon. Thos. E., M.P. 27, *Ashley-place, Victoria-street, S.W.* |
| 1859 | | Heard, G. G. Gilbert, Esq., F.S.A. 18, *Devonshire-terrace, Hyde-park, W.* |
| 1856 | | Heath, J. Benj., Esq., F.R.S., F.S.A., Consul for Sardinia. 31, *Old Jewry, E.C.* |
| 1863 | 870 | Heathfield, W. L., Esq. 20, *King-street, St. James's, S.W.* |
| 1861 | | Hector, Alexander, Esq. 6, *Stanley-gardens, Bayswater, W.* |
| 1851 | | Hector, James, Esq., M.D. |

| Year of Election | | |
|---|---|---|
| 1859 | | Hely, Hovendon, Esq. *Australian Club, Sydney.* |
| 1862 | | Hemans, Geo. Willoughby, Esq., C.E. 13, *Queen's-square, Westminster, S.W.* |
| 1856 | | Henderson, Andrew, Esq. 102, *Gloucester-place, Portman-square, W.* |
| 1847 | | *Henderson, James, Esq. *Littlewood-park, Forbes, Aberdeenshire.* |
| 1853 | | Henderson, John, Esq. *Conservative Club, S.W.; and Valparaiso.* |
| 1864 | | Henderson, R., Esq. *Rambil's-park, Leatherhead, Surrey, S.* |
| 1852 | | Henderson, William, Esq. 5, *Stanhope-street, Hyde-park-gardens, W.* |
| 1844 | 882 | *Heneage, Edward, Esq. *Stag's-end, Hemel Hempstead.* |
| 1863 | | Heneage, P. F., Esq. 39, *Charles-street, Berkeley-square, W.* |
| 1861 | | Henn, Rev. J., B.A., F.G.S., Head Master of the Commercial Schools. *Old Trafford, Manchester.* |
| 1860 | | Hennessey, J. B. N., Esq. *1st Asst. Trig. Survey of India, Dehra in the Doon, N.W. Provinces, India.* |
| 1862 | | Henry, Capt. R. J. *Army and Navy Club, S.W.* |
| 1858 | | *Henry, Wm. Chas., Esq., M.D., F.R.S. *Highfield, near Ledbury, Herefordshire.* |
| 1861 | | *Henty, Douglas, Esq. *Chichester.* |
| 1864 | | Herbert, George, Esq. *University School, near Nottingham.* |
| 1854 | | Herbert, Jacob, Esq. *Trinity-house, Tower-hill, E.C.* |
| 1857 | | Herd, Captain D. J. 2, *Normyn-house, Limehouse, E.* |
| 1858 | 890 | Hertslet, Edward, Esq. *Librarian, Foreign Office, S.W.; and Belle-vue-house, Richmond, S.W.* |
| 1841 | | Hessey, James Augustus, Esq. *Munningford Bruce, Pewsey, Wilts.* |
| 1861 | | Heugh, John, Esq. *Tonbridge-wells.* |
| 1858 | | Hewett, Capt. J. A. Napier. *Valhalla-house, Trevine, Haverfordwest.* |
| 1856 | | Hewitt, James, Esq. *Rottingdean, Brighton.* |
| 1859 | | Hewitt, Captain William Nathan Wright, R.N. *H.M.S. 'Viper,' W. Coast of Africa.* |
| 1840 | | *Heywood, James, Esq., F.R.S. *Athenæum Club, S.W.; and 26, Kensington-palace-gardens, W.* |
| 1860 | | Heyworth, Capt. Lawrence, 4th Royal Lancashire. *Jun. United Service Club, S.W.* |
| 1853 | | Hickey, Edwin A., Esq. |
| 1856 | | Hill, Arthur Bowdler, Esq. *South-road, Clapham-park, Surrey, S.* |
| 1857 | 900 | Hill, Rev. C. Croft, M.A. *Southfield, Clapham-park, Surrey, S.* |
| 1854 | | Hill, Lieut.-Colonel Stephen J. *Army and Navy Club, S.W.; and Governor of Antigua.* |
| 1865 | | Hill, Samuel S., Esq. *Reform Club, S.W.; and 57, Sackville-st., Piccadilly, W.* |
| 1861 | | Hilliard, Major George Towers, Madras Staff Corps. 43, *Upper Seymour-street, Portman-square, W.; and India.* |
| 1858 | | Hinchliff, T. Woodbine, Esq., Barrister-at-Law. 64, *Lincoln's-inn-fields, W.C.* |
| 1859 | | Hind, Professor Henry Youle, M.A. *Toronto, Canada West.* |
| 1862 | | *Hinde, Samuel Henry, Esq. 130, *Piccadilly, W.* |
| 1846 | | *Hindmarsh, Frederick, Esq. 17, *Bucklersbury, E.C.* |
| 1861 | | Hoare, Deane John, Esq. *Royal Thames Yacht Club, Albemarle-street, W.* |
| 1846 | | Hobbs, J. S., Esq. 157, *Leadenhall-street, E.C.* |

| Year of Election. | |
|---|---|
| 1855 | 910 Hobbs, Wm. Geo. Ed., Esq. *Master of Grammar School, Wureside, near Ware.* |
| 1850 | *Hobhouse, Henry William, Esq. 24, *Cadogan-place, S.W.* |
| 1861 | Hodgins, J. George, Esq., Chief Assist. Depart. of Public Instr. *Toronto, Upper Canada.* |
| 1834 | *Hodgkin, Thomas, Esq., M.D. 35, *Bedford-square, W.C.* |
| 1856 | *Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Company. *Drayton-hall, West Drayton, near Uxbridge.* |
| 1861 | Hodgson, Christopher Pemberton, Esq. |
| 1861 | *Hodgson, James Stewart, Esq. 8, *St. Helen's-place, E.C.* |
| 1857 | Hodgson, Kirkman Daniel, Esq., M.P. 8, *St. Helen's-place, E.C.* |
| 1856 | Hogg, James, Jun., Esq. 31, *Mecklenburg-square, W.C.* |
| 1830 | Hogg, John, Esq., M.A., F.R.S., F.L.S., V.-Pres. Royal Society of Literature, &c. 8, *Serjeants'-inn, Temple, E.C.; and Norton-house, Stockton-upon-Tees.* |
| 1839 | 920*Holford, Robert S., Esq., M.P. *Dorchester-house, Park-lane, W.* |
| 1830 | Holland, Sir Henry, Bart., M.D., F.R.S. 25, *Lower Brook-street, W.* |
| 1861 | Holland, Colonel James. 24, *Prince's-square, Kensington-gardens, W.* |
| 1863 | Holland, Loton, Esq. *Swanscoe, near Macclesfield.* |
| 1862 | Holland, Robert, Esq. *Stanmore-hall, Great Stanmore, Middlesex.* |
| 1861 | *Hollingsworth, John, Esq., M.R.C.S. *Beckey-place, Greenwich, S.E.* |
| 1861 | Holme, J. Wilson, Esq., M.A. *Beckenham, Kent, S.E.* |
| 1835 | *Holmes, James, Esq. 4, *New Ormond-street, Queen-square, W.C.* |
| 1864 | Holmes, Capt. R. C. *Vine-house, The Mall, Chiswick; and Army and Navy Club, S.W.* |
| 1862 | Holmes, Sir William H. |
| 1861 | 930 Holms, John, Esq. 16, *Cornwall-gardens, Queen's-gate, W.* |
| 1839 | *Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Athenæum Club, S.W.* |
| 1857 | Holroyd, Henry, Esq. Barrister-at-Law. 2, *Elm-court, Temple, E.C.* |
| 1864 | Holt, Vesey, Esq. 63, *Warwick-square, W.* |
| 1857 | Homfray, Frederick Samuel, Esq., C.E. 6, *Storey's-gate, S.W.* |
| 1857 | Homfray, William Henry, Esq. 6, *Storey's-gate, S.W.* |
| 1864 | *Hood, Sir Alex. Acland, Bart., M.P. *St. Andrie's-park, Bridgewater, Somerset.* |
| 1862 | Hood, Henry Schuback, Esq. *War Office, S.W.; and* 10, *Kensington-park-gardens, W.* |
| 1861 | Hood, Thomas Hood, Esq. *Stoneridge, Berwickshire.* |
| 1859 | *Hood, William Charles, Esq., M.D. *Bethlehem Hospital, S.* |
| 1861 | 940 Hopcraft, George, Esq. 3, *Bibster-square, E.C.* |
| 1846 | *Hope, Alex. James Beresford, Esq., M.P. *Arklow-house, Connaught-place, Hyde-park, W.; and Bedgebury-park, Hurst-green, Kent.* |
| 1862 | Hope, Capt. C. Webley, R.N. *H.M.S. 'British,' Australia; Messrs. Hallett & Co.* |
| 1857 | Hoper, Richard, Esq. 53, *Margaret-street, Cavendish-square, W.; and Coufold Horsham, Sussex.* |
| 1861 | Hoskins, Capt. A. H., R.N. *Army and Navy Club, S.W.* |
| 1859 | Hoskyns, Chandos Wren, Esq. *Wadshall-abbey, Warwickshire.* |

| Year of Election. | |
|---|---|
| 1853 | Houghton, Lord, M.P. 16, *Upper-brook-street, W.; The Hall, Bawtry; and Tryston-hall, Ferrybridge, Yorkshire.* |
| 1856 | Hovell, William Hilton, Esq. *Goulburn, New South Wales.* |
| 1864 | Howell, W. G., Esq. |
| 1853 | Howard, Sir Ralph, Bart. 17, *Belgrave-sq., S.W.; and Bushy-park, Wicklow.* |
| 1857 | 950 Howard, Samuel Lloyd, Esq. *Goldings, Loughton, Essex.* |
| 1842 | *Hubbard, J. Gellibrand, Esq., M.P. 24, *Prince's-gate, Hyde-park-south, W.* |
| 1865 | Hudson, Rev. Charles. *Skillington, Grantham, Lincolnshire.* |
| 1857 | Hughes, Capt. Sir Frederic. *Ely-house, Wexford.* |
| 1858 | Hughes, William, Esq. 63, *Oakley-square, St. Pancras, N.W.* |
| 1858 | *Hume, Edmund Kent, Esq. |
| 1860 | *Hume, Hamilton, Esq. *Cooma Pass, New South Wales.* |
| 1861 | Hunt, George S. Lennox, Esq., H.B.M. Consul, *Pernambuco.* |
| 1857 | Hunt, Zachariah Daniel, Esq. *Aylesbury.* |
| 1862 | Hunter, Henry Lannoy, Esq. *Beech-hill, Reading.* |
| 1858 | 960 Hutchinson, Thomas J., Esq., F.R.S.L., F.L.S., F.A.S.L., H.B.M. Consul, *Rosario, Argentine Republic.* |
| 1864 | Hutchinson, Capt. R. R. *Eltham-cottage, Tooley-road, Brenton.* |
| 1851 | Hyde, James Bartlet, Esq. 43, *Prowy-road, Kilburn, N.W.* |
| 1860 | *Hyde, Captain Samuel. 8, *Bullter-square, E.C.* |
| | |
| 1865 | Illingworth, Rev. Edward A. 3, *Mecklenburg-street, W.C.* |
| 1852 | Illingworth, Richard Stonhewer, Esq. 9, *Norfolk-crescent, Hyde-park, W.* |
| 1850 | *Imray, James Frederick, Esq. 102, *Minories, E.; and Beckenham, Kent, S.E.* |
| 1861 | *Ingall, Samuel, Esq. 1, *Old Broad-street, E.C.: and Forest-hill, Kent, S.E.* |
| 1860 | Ingilby, the Rev. Henry John. *Ripley-castle, Ripley, Yorkshire.* |
| 1851 | Inglefield, Captain Edward A., R.N., F.R.S. *United Service Club, S.W.* |
| 1846 | 970 Ingram, Hughes Francis, Esq. *University Club, S.W.* |
| 1863 | Innes, Capt. Alex. 97, *Islington, Liverpool.* |
| 1860 | *Inskip, G. H., Esq., Master R.N. *H.M. Surveying Vessel 'Seaflower;' and 23, Anne-street, Sunderland.* |
| 1852 | *Inskip, Rev. Robert Mills. 8, *Boon's-place, Plymouth.* |
| 1840 | *Irby, Frederick W., Esq. *Athenæum Club, S.W.* |
| 1864 | *Irving, John, Esq. |
| 1853 | Irving, Thomas, Esq. 6, *Minerva-terrace, Barnsbury-park, Islington, N.* |
| 1862 | Irwin, James V. H. 8, *Duke-street, St. James's, S.W.* |
| 1862 | Isaac, Frederick N., Esq. *Old Bank, Worcester.* |
| 1864 | Ives, W. T., Esq. *St. John's School, Linehouse, E.* |
| 1865 | 980 Izard, Frederick, Esq., 141, *High Holborn, W.C.* |
| | |
| 1855 | Jackson, William, Esq., M.P. 10, *Mansfield-street, W.* |
| 1862 | Jacomb, Thomas, jun., Esq. 23, *Old Broad-street, Gresham-house, E.C.* |

| Year of Election. | |
|---|---|
| 1857 | James, Colonel Sir Henry, R.E., F.R.S. *Director of the Ordnance Survey, Southampton.* |
| 1861 | James, William Bosville, Esq. 13, *Blomfield-road, Maida-hill, W.* |
| 1862 | *Jaques, Leonard, Esq. *Easby-abbey, Richmond, Yorks.* |
| 1863 | *Jardine, Andrew, Esq. *Lanrick-castle, Stirling.* |
| 1863 | *Jardine, Robert, Esq., M.P. *Castlemilk, Lockerby, N.B.* |
| 1857 | Jefferson, Richard, Esq. A4, *The Albany, W.* |
| 1863 | Jeffreys, Edw. W. *Conservative Club, S.W.* |
| 1860 | 999*Jejeebhoy, Sir Jamsetjee, Bart. *Bombay.* |
| 1854 | Jellicoe, Charles, Esq. 25, *Chester-terrace, N.W.* |
| 1859 | Jencken, H. Diedrich, Esq. 1, *Brick-court, Temple, E.C.; and* 2, *York-terrace, Upper Sydenham, S.E.* |
| 1854 | Jenkins, Capt. Griffith, I.N., C.B. *East India Club, St. James's-square, S.W., and Dercen, Welch Pool, Montgomeryshire.* |
| 1837 | *Jenkins, R. Castle, Esq. *Beachley, near Chepstow.* |
| 1854 | *Jennings, William, Esq., M.A. 13, *Victoria-street, Westminster, S.W.* |
| 1862 | Jerdein, John, Esq. |
| 1860 | Jermyn, Rowland Formby, Esq. *War Office, S.W.* |
| 1850 | Jessopp, Rev. Augustus, M.A., Head Master, King Edward VI. School. *Norwich.* |
| 1864 | *Jeula, Henry, Esq. *Lloyd's, E.C.* |
| 1864 | 1000*Jeyes, F. F., Esq. *Castle-hill, Ealing, W.* |
| 1858 | Johnson, Capt. Clement. *Carlton Club, S.W.; and* 1, *Whitehall, S.W.* |
| 1847 | Johnson, Edmund Chas., Esq. C3, *Albany, Piccadilly, W., and* 6, *Savile-row, W.* |
| 1859 | *Johnson, Henry, Esq. 39, *Crutched-friars, E.C.* |
| 1854 | Johnson, John Hugh, Esq. |
| 1861 | Johnson, William, Esq., R.N. *R. T. Y. Club,* 7, *Albemarle-street, W.* |
| 1843 | Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. Berl. Geog. Soc., &c. *Murchhall-park; and* 4, *St. Andrew-square, Edinburgh.* |
| 1856 | Johnston, A. R., Esq., F.R.S. *Athenæum Club, S.W.* |
| 1857 | Johnston, J. Brookes, Esq. 29, *Lombard-street, E.C.* |
| 1858 | Johnston, Capt. J. Gilbert. 8, *York-terrace, Regent's-park, N.W.* |
| 1853 | 1010Johnstone, Sir John V. B., Bart., M.P., D.C.L. 34, *Belgrave-square, W.; and Hackness-hall, near Scarborough.* |
| 1858 | Jones, Capt. Edward Mouckton, 20th Regt. |
| 1864 | Jones, Capt. Felix. 7, *Walton-villas, Brompton, S.W.* |
| 1851 | Jones, Lieut.-General Sir Harry D., R.E., K.C.B. *R. M. College, Farnborough Station, Hants.* |
| 1857 | Jones, Capt. Jenkin, Bombay Engineers. 1, *Leonard-place, Circus-road, St. John's-wood, N.W.; and India.* |
| 1862 | Jones, John, Esq. 338, *Strand, W.C.* |
| 1861 | Jones, John Pryce, Esq. *Grove-park School, Wrexham.* |
| 1861 | Jones, Sir Willoughby, Bart. *Cranmer-hall, Fakenham, Norfolk.* |
| 1865 | Jones-Bylom, Commander W. H., R.N. *Leek, Staffordshire; and Army and Navy Club, S.W.* |

| Year of Election. | |
|---|---|
| 1863 | Joshua, Moss, Esq. *Melbourne; and* 22, *Clifton-gardens, Maida-hill, W.* |
| 1863 | 1020Jourdain, Frederick John, Esq. 10, *Austin-friars, E.C.* |
| 1855 | Kane, Major Fred. A. C., 15th Regt. Bombay N.I. *Junior U. Service Club, S.W.* |
| 1858 | Kay, David, Esq. |
| 1869 | Keate, R. W., Esq., Lieutenant-Governor, *Trinidad.* |
| 1857 | Keating, Sir Henry Singer, Q.C., one of the Judges of the Court of Common Pleas. 11, *Prince's-gardens, S.W.* |
| 1857 | Keene, Rev. C. E. Rock. *Stepney-park, Henley-upon-Thames.* |
| 1863 | Keir, Simon, Esq. *Conservative Club, S.W.* |
| 1845 | *Kellett, Rr.-Adm. Henry, C.B. *Clonmel, Ireland.* |
| 1861 | Kelly, William, Esq. *Royal Thames Yacht Club,* 7, *Albemarle-street, W.* |
| 1860 | *Kemball, Col. Arnold Barrowes, C.B., Indian Army. *H.M.'s Consul-General, Bagdad; and* 6, *Chester-place, Hyde-park, W.* |
| 1863 | 1030Kempster, J., Esq. 1, *Portsmouth-place, Kennington-lane, Surrey, S.* |
| 1860 | Kendall, Henry, Esq., Consul for Peru. 12, *Old Broad-street, E.C.; and The Limes, Mortlake, S.W.* |
| 1861 | Kennard, Adam Stemmatz, Esq. 7, *Fenchurch-street, E.C.* |
| 1859 | Kennard, Coleridge J., Esq. 14, *London-street, E.C.; and* 13, *Prince's-terrace, Prince's-gate, S.W.* |
| 1861 | Kennard, Robert William, Esq., M.P. 37, *Pembroke-terrace, Hyde-park, W.* |
| 1861 | Kennedy, Edward Shirley, Esq. *Esher, Surrey.* |
| 1863 | Kennedy, Lord Gilbert. *West-court, Wokingham.* |
| 1854 | Kennedy, Rev. John, M.A. 4, *Stepney-green, E.* |
| 1851 | Kent, John, Esq. *Shafston, Moreton-bay, Australia.* |
| 1864 | Ker, Lord Schomberg. 15, *Bruton-street, W.* |
| 1863 | 1040Kerr, J. H., Esq., R.N. *Hydrographic Office, S.W.* |
| 1862 | Kershaw, Wm., Esq. 16, *St. Mary Axe, E.C.: and Suffolk-lodge, Brixton-road, S.* |
| 1859 | Key, Capt. Astley Cooper, R.N., C.B. *United Service Club, S.W.* |
| 1862 | Key, J. Binney, Esq. *Oriental Club, W.* |
| 1857 | Keysell, Francis P., Esq. *Sycamore-villa,* 35, *Carlton-hill, St. John's-wood, N.W.* |
| 1864 | *Kibble, W. W., Esq. |
| 1864 | Kimber, Dr. E. *Grafton-villa, Loughborough-park, S.* |
| 1846 | King, Lieut.-Colonel Edward R., 36th Regt. *Junior United Service Club, S.W.* |
| 1858 | King, Rev. Samuel W., A.M. *Saxlingham-rectory, Norwich.* |
| 1861 | King, Major W. Ross, Unatt., F.S.A. Scot. *Tertowie, Kincllar, Aberdeenshire: and Army and Navy Club, S.W.* |
| 1857 | 1050Kinkel, Gottfried, Esq., PH. DR. 23, *Bloomfield-road, Maida-hill, W.* |
| 1857 | *Kinnaird, Hon. Arthur F., M.P. 2, *Pall-mall-east, S.W.* |
| 1860 | Kinns, Samuel, Esq., PH. DR., F.R.A.S. *Highbury-new-park College, N.* |
| 1858 | Kirk, John, Esq., M.D. 45, *George-square, Edinburgh.* |
| 1863 | Kirke, John, Esq., Barrister. 32, *Harley-street, Cavendish-square, W.* |
| 1861 | Kirkland, Sir John. 17, *Whitehall-pl., S.W.; and Foot's-cray-pl., Kent, S.E.* |

| Year of Election. | |
|---|---|
| 1835 | *Kjaer, Thomas Andreas, Esq. *Hjornet af Kongins Nytorv og Gothersgade* No. 26, *3d Sahl, Copenhagen.* |
| 1862 | Knollys, Lieut.-General W. T., V.-Pres. Council of Military Education. *Eaton-square, S.W.* |
| 1861 | Knox, Thomas G., Esq. *India.* |
| 1861 | Kyd, Hayes, Esq., M.R.C.S. *Wadebridge, Cornwall.* |
| 1859 | 1060Labrow, Valentine H., Esq. *Mitre-court-chambers, Temple, E.C.; and Club-chambers, S.W.* |
| 1860 | Labuan, Right Rev. F. T. MacDougall, Bishop of. |
| 1849 | *Laffan, Capt. Robert Michael, R.E. *Army and Navy Club, S.W.; and Otham-lodge, Kent.* |
| 1859 | Lamb, Lieut. Henry, I.N. 108, *Leadenhall-street, E.C.* |
| 1863 | *Lambert, Alan, Esq. 2, *Portugal-street, South Audley-street, W.* |
| 1864 | Lambert, Charles, Esq. 2, *Queen-street-place, Upper Thames-street, E.C.* |
| 1864 | Lamert, Capt. G. F. 20, *Albemarle-street, W.* |
| 1861 | Lamont, James, Esq., M.P. *Brooks's Club, S.W.* |
| 1865 | Lampray, Thomas, Esq. *Warrior-lodge, The Grove, Hammersmith, W.* |
| 1864 | Lampson, C. M., Esq. 64, *Queen-street, Cheapside, E.C.* |
| 1838 | 1070*Lance, John Henry, Esq., F.L.S. *The Holmwood, Dorking.* |
| 1861 | *Lang, Andrew, Esq. *Dunmore, Hunter-river, New South Wales; and Dunmore, Teignmouth, Devon.* |
| 1859 | *Lange, Daniel A., Esq. 21, *Regent-street, W.* |
| 1856 | Langler, J. R., Esq., Lecturer, Wesleyan Normal Institution. *Westminster, S.W.* |
| 1865 | Langley, Edward, Esq. *Well-hall, Eltham, Kent.* |
| 1857 | Lansdowne, Marquis of. *Lansdowne-house, Berkeley-square, W.* |
| 1833 | *Larcom, Maj.-General Sir Thomas Askew, R.E., K.C.B., F.R.S. *Castle, Dublin.* |
| 1861 | Lardner, Col. John. *United Service Club, S.W.* |
| 1859 | Larnach, Donald, Esq. 21, *Kensington-palace-gardens, W.* |
| 1854 | Latrobe, Ch. J., Esq. *Athenæum Club, S.W.; and Whitbourne-court, Worcester.* |
| 1862 | 1080*Laurie, John M., Esq. 4, *St. George's-place, S.W.; and Maxwelton-house, Thornhill, Dumfriesshire.* |
| 1846 | *Law, Hon. H. Spencer, M.A. 1, *Lowndes-st., S.W.; and Ellington-ho., Ramsgate.* |
| 1830 | Law, William J., Esq. 63, *Upper Seymour-street, W.*; 23, *Lincoln's-inn-fields, W.C.*; and 5, *Sussex-square, Brighton.* |
| 1861 | Lawrence, Edward, Esq. *Beechmont, Aigburth, Liverpool.* |
| 1862 | *Lay, Horatio, N., Esq., Commissioner of Foreign Customs in China. |
| 1857 | Layard, Austen H., Esq., M.P., D.C.L. 130, *Piccadilly, W.* |
| 1860 | Leader, Nicholas P., Esq., M.P. *Conservative Club, S.W.; and Dromagh, Cork.* |
| 1863 | *Leaf, Chas. J., Esq. *Old-cottage, E.C.; and The Rylands, Norwood, S.* |
| 1861 | *Learmonth, Dr. John. *Ryde, Isle of Wight.* |
| 1853 | *Le Breton, Francis, Esq. 21, *Sussex-place, Regent's-park, N.W.* |
| 1865 | 1090Le Feuvre, W. H., Esq., C.E. 18, *Great George-street, S.W.* |

| Year of Election. | |
|---|---|
| 1861 | Leckie, Patrick C., Esq. 7, *Palace-road, Rompell-park, Streatham, S.* |
| 1830 | *Lee, John, Esq., LL.D., D.C.L., Pres. of the R. Astr. Soc., F.R.S., F.S.A., F.R.S.N.A., &c. *Hartwell-house, near Aylesbury, Bucks.* |
| 1839 | Lee, Thomas, Esq. 78, *Westbourne-park-villas, W.* |
| 1861 | Lefevre, George Shaw, Esq., M.P. 8, *Spring-gardens, S.W.* |
| 1833 | *Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 8, *Spring-gardens, S.W.* |
| 1853 | Lefroy, General John Henry, R.A., F.R.S. *Royal Arsenal, Woolwich, S.E.* |
| 1862 | Leggatt, Clement Davidson, Esq. 43, *Inverness-terrace, W.* |
| 1861 | Legh, Wm. John, Esq. 37, *Lowndes-square, S.W.; and Lyme-park, Cheshire.* |
| 1861 | *Lehmann, Frederick, Esq. 139, *Westbourne-terrace, W.* |
| 1845 | 1100Leigh, John Studdy, Esq. 54, *Leinster-square, Kensington-gardens, W.* |
| 1863 | Le Mesurier, Henry P., C.E. *St. Martin's, Guernsey.* |
| 1863 | Le Messurier, M.-Gen., A.P. 2, *Stanhope-terrace, Hyde-park, W.* |
| 1836 | Lemon, Sir Charles, Bart., F.R.S., &c. *Carclew, near Falmouth, Cornwall.* |
| 1857 | *Lenox, George Wm., Esq. 34, *Portland-place, W.; and Pont-y-Pridd, Glamorganshire.* |
| 1856 | Leslie, the Hon. G. W. 4, *Hurley-street, W.* |
| 1859 | Leslie, Walter D., Esq. *Arthur's Club, St. James's-street, S.W.* |
| 1862 | Leslie, Wm., Esq. *Warthill, Aberdeenshire; and Carlton Club, S.W.* |
| 1840 | *Letts, Thomas, Esq. 8, *Royal Exchange, E.C.* |
| 1863 | Leveaux, E. H., Esq. 25, *The Cedars, Putney, S.W.* |
| 1857 | 1110Leveson, George B. C., Esq. 73, *Gloucester-terrace, Hyde-park, W.* |
| 1862 | Levick, Joseph, Esq. 8, *Great Winchester-street, Old Broad-street, E.C.* |
| 1859 | Levinsohn, Louis, Esq. 7, *Finsbury-square, E.C.* |
| 1859 | Lewis, Rev. Evan, B.A. *Accrington, Lancashire.* |
| 1852 | Leycester, Commander Edmund M., R.N., Superintendent of Packets and Transports. *Admiralty-office, Liverpool.* |
| 1861 | Leyland, Luke Swallow, Esq. *The Leylands, Hatfield, Doncaster.* |
| 1859 | Lichfield, Thomas George, Earl of. *Shugborough, Staffordshire.* |
| 1856 | Lilford, Thomas Lyttleton Powys, Lord. 10, *Grosvenor-place, W.* |
| 1860 | Lindsay, H. Hamilton, Esq. 22, *Berkeley-square, W.* |
| 1857 | Lindsay, Maj.-Gen. the Hon. J., Gren. Guards, M.P. 20, *Portman-square, W.* |
| 1861 | 1120Lindsay, W. Lauder, Esq., M.D., F.R.S. Edin., F.L.S. London. *Gilgal, Perth, N.B.* |
| 1855 | *Lindsay, Wm. S., Esq. *Manor-house, Shepperton, Middlesex.* |
| 1858 | Lister, John, Esq. 24, *Leinster-terrace, Upper Hyde-park-gardens, W.* |
| 1861 | Lloyd, Alexander Ogilvie, Esq., M.A. *Hazlecroft, Ripley, Yorkshire.* |
| 1857 | *Lloyd, George A., Esq. 2, *Royal Exchange-buildings, E.C.* |
| 1864 | Lloyd, W., Esq. *Wolmesley, near Birmingham.* |
| 1861 | Lluellyn, Capt. Richard. 20, *Montagu-square, W.* |
| 1863 | Loch, George, Esq. 12, *Albemarle-street, W.* |
| 1859 | Loch, Henry Brougham, Esq. *Government-house, Isle of Man.* |
| 1861 | Loch, John Charles, Esq. 12, *Albemarle-street, W.; and Hong-Kong.* |

| Year of Election | | |
|---|---|---|
| 1857 | 1130 | Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.* |
| 1864 | | Locke, John, Esq. 83, *Addison-road, Kensington.* |
| 1858 | | Lockhart, William, Esq., F.R.C.S. *Park-villas, Granville-park, Blackheath, S.E.; and China.* |
| 1860 | | Lockwood, James Alfred. *United Arts Club, Hanover-square, W.* |
| 1856 | | *Logan, Sir William Edmond, F.R.S. *Montreal, Canada.* |
| 1859 | | Londesborough, Wm. Henry Forester, Lord. *Thomas's-hotel, 25, Berkeley-sq., W.* |
| 1850 | | Long, George, Esq., M.A. 22, *Buckingham-street, Brighton.* |
| 1839 | | *Long, Henry L., Esq. *Travellers' Club, S.W.; and Hampton-lodge, Farnham, Surrey.* |
| 1857 | | *Long, W. Beeston, Esq. |
| 1858 | | Longden, Morrell D., Esq. 4, *Eaulsmore-place, Hyde-park, S.W.* |
| 1847 | 1140 | Longman, Thos., Esq. *Paternoster-row, E.C.: and 8, Sussex-sq., Hyde-park, W.* |
| 1858 | | Longman, William, Esq. 36, *Hyde-park-square, W.* |
| 1861 | | Lonsdale, Arthur Pemberton, Esq. |
| 1860 | | Looker, William Robert, Esq. *Melbourne, Australia; care of Mr. Ashhurst, 16, Bishopsgate-street-within, E.C.* |
| 1861 | | Lorimer, George B., Esq. |
| 1863 | | Lovell, Capt. 6, *Granville-park-villas, Blackheath, S.E.* |
| 1856 | | Lovett, Phillips Cosby, Esq. *Liscombe-ho., Liscombe, Leighton Buzzard, Bucks.* |
| 1861 | | Low, Robert, Esq. 17, *Woburn-square, W.C.* |
| 1863 | | Low, S. P., Esq. 55, *Parliament-street, S.W.* |
| 1858 | | Lowden, Rev. George Rouse. 12, *Leinster-gdns., Hyde-park, W.; and Uxbridge.* |
| 1859 | 1150 | Lowe, Capt. W. Drury. *Myrna, Bettws-y-Coed, Llanrwst, North Wales.* |
| 1863 | | Lowndes, E. C., Esq. 84, *Eaton-place, S.W.* |
| 1859 | | Lowry, Joseph Wilson, Esq. 45, *Robert-street, Hampstead-road, N.W.* |
| 1860 | | Loyd, Col. W. K. *Union Club, S.W.* |
| 1864 | | Lucas, Samuel, Esq. 6, *Cork-street, Portman-square, W.* |
| 1860 | | Luke, William, Esq., Bengal Civil Service. 93, *Inverness-terr., Hyde-park, W.* |
| 1860 | | Lumsden, Rev. Robert Comyn, M.A. *Cheadle, Manchester.* |
| 1860 | | Lush, Robert, Esq., Q.C. *Balmoral-house, Avenue-road, Regent's-park, N.W.* |
| 1850 | | *Lyell, Sir Charles, M.A., LL.D., F.R.S. 53, *Harley-street, Cavendish-square, W.* |
| 1837 | | *Lynch, Capt. H. Blosse, I.N., C.B., F.R.A.S. *Athenæum Club, S.W.* |
| 1861 | 1160 | *Lynch, Thomas Kerr, Esq. 31, *Clevedon-square, Hyde-park, W.* |
| 1858 | | Lyne, Francis, Esq. |
| 1862 | | Lyon, David, Esq. 31, *South-street, Park-lane, W.* |
| 1862 | | *Macarthur, Major-Gen. Sir Edward, K.C.B. 27, *Prince's-gardens, W.* |
| 1863 | | Macbraire, James, Esq. *Broadmeadows, Berwick-on-Tweed.* |
| 1862 | | Macdonald, Chessborough C., Esq. 32, *Belsize-park, Hampstead, N.W.* |
| 1863 | | Macdonald, Duncan George Forbes, Esq., C.E. 13, *Royal Exchange, E.C.* |

| Year of Election | | |
|---|---|---|
| 1843 | | Macdonnell, Sir Richard Graves, C.B., late Governor of S. Australia. 36, *Winchester-street, S.W.* |
| 1858 | | MacDougall, Alex. H., Esq. 44, *Parliament-street, Westminster, S.W.* |
| 1863 | | Macfarlan, George, Esq. *Christ-church, Canterbury, New Zealand.* |
| 1865 | 1170 | Macfarlane, John G., Esq. *Clyde-villa, Auckland, Upper New Zealand.* |
| 1865 | | Macfie, Rev. M. *Colonial Missionary society, Bloomfield-street, Finsbury; and Victoria, Vancouver Island.* |
| 1861 | | MacGeorge, Colonel, Bengal Army. 18, *Cleveland-square, W.* |
| 1856 | | Macgregor, Alexander, Esq. *Sec. to the West India Committee Rooms, Walbrook-house, Walbrook, E.C.* |
| 1839 | | Macintosh, Lieut.-General Alex. Fisher, K.H. 7, *Tilney-street, Park-lane, W.* |
| 1861 | | Mackintosh, Alexander Brodie, Esq. *Oriental Club, W.; and Duncan, Scotland.* |
| 1845 | | *Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 9, *Chapel-street, Stratford-on-Avon.* |
| 1859 | | Mackay, Rev. Alexander, A.M. *Rhynie, Aberdeenshire.* |
| 1860 | | Mackay, Thomas Miller, Esq. 24, *Leinster-gardens, Bayswater, W.* |
| 1859 | | *Mackean, Thos. W. L., Esq. 24, *Oxford-square, Hyde-park, W.* |
| 1862 | 1180 | Mackenzie, Colin J., Esq. *Windham Club, S.W.* |
| 1845 | | Mackenzie, Right Hon. Holt, F.R.A.S. *Athenæum Club, S.W.: and 28, Wimpole-street, W.* |
| 1861 | | Mackenzie, Sir James J. Randall, Bart. *Travellers' Club, S.W.; and Scatwell, Roschaugh, Muirlochy, N.B.* |
| 1860 | | *Mackenzie, James T., Esq. 69, *Lombard-street, E.C.* |
| 1863 | | Mackenzie, John H., Esq. *Walbuton, Carshalton, Surrey.* |
| 1864 | | *Mackeson, Edward, Esq. 59, *Lincoln's-inn-fields, W.C.* |
| 1830 | | Mackillop, James, Esq., F.R.A.S. 30, *Grosvenor-square, W.* |
| 1862 | | Mackinly, D., Esq. *Oriental Club, W.* |
| 1864 | | Mackinnon, C. D., Esq. *Care of Messrs. J. Cluch and Sons, 31, Abchurch-lane, E.C.* |
| 1861 | | Mackinnon, Lachlan, Esq. *Reform Club, S.W.: and Battay-house, Mitchell, N.W.* |
| 1855 | 1190 | Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.* |
| 1860 | | Mackirdy, Lt.-Col. Elliot, 60th Rgt. *U.S. Club, S.W.; and Tonghon, Birmah.* |
| 1860 | | Maclean, William Crighton, Esq., F.R.S.E. 5, *Camperdown-terr., Great Yarmouth.* |
| 1859 | | Maclear, Sir Thomas. *Astronomer Royal, Cape of Good Hope.* |
| 1859 | | MacLeay, George, Esq. *Athenæum Club, S.W.; and Sydney.* |
| 1855 | | Maclure, Andrew, Esq. *Maclure, Macdonald, and Macgregor, 37, Walbrook, E.C.* |
| 1861 | | Maclure, John William, Esq. 2, *Bond-street, Manchester.* |
| 1860 | | Macmillan, Alex., Esq. 23, *Henrietta-st., Covent-garden, W.C.* |
| 1865 | | Macmurdo, G. W., Esq. 7, *New Broad-street, E.C.* |
| 1855 | | Macnab, John, Esq. *Steel's-place, Leith-walk, Edinburgh.* |
| 1856 | 1200 | *Macpherson Duncan, Esq., M.D., Inspector-General of Hospitals. |
| 1861 | | Macpherson, William, Esq. 6, *Stanhope-street, Hyde-park-gardens, W.* |
| 1845 | | Macqueen, James, Esq., K.G., Tower and Sword of Portugal. 4, *Alma-terrace, Hammersmith, W.* |

| Year of Election. | |
|---|---|
| 1864 | Macrae, Colin W., Esq. *Oriental Club, Hanover-square, W.* |
| 1863 | McArthur, Alex., Esq. *Rokeby-hall, Brixton-rise, Brixton, S.* |
| 1860 | McClintock, Capt. Sir Francis Leopold, R.N. *United Service Club, S.W.* |
| 1861 | *McConnell, W. R., Esq., Barrister-at-Law. 12, *King's-bench-walk, E.C.; and Charleville, Belfast.* |
| 1862 | McCosh, John, Esq., M.D. *Junior United Service Club, S.W.* |
| 1865 | McDonald, James, Esq. *Oriental Club, Hanover-square, W.* |
| 1865 | McEuen, D. P., Esq. 24, *Pembridge-square, Bayswater, W.* |
| 1865 | 1210McEwan, James, Esq. *Addiscombe-lodge, St. James's-road, Croydon, S.* |
| 1859 | McGrath, John C., Esq. *Reform Club, S.W.* |
| 1855 | McGregor, Duncan, Esq. *Board of Trade, S.W.; and Athenæum Club, S.W.* |
| 1858 | McKerrell, Robert, Esq. 45, *Inverness-terrace, W.; and Mauritius.* |
| 1855 | *M'Clure, Captain Sir Robert J. le M., R.N. *H.M.S. 'Assistance.'* |
| 1862 | M'Dougall, Geo. Fred., Esq., R.N. *Hydrographic Office, Admiralty, S.W.; and* 51, *Oxford-road, Kilburn, N.W.* |
| 1852 | M'Leod, J. Lyons, Esq., late Consul for Mozambique. |
| 1852 | M'Leod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.* |
| 1839 | M'Neil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.* |
| 1861 | *Maguire, Capt. Rochfort, R.N. *United Service Club, S.W.* |
| 1853 | 1220Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club, S.W.;* 152, *Albany-street, Regent's-park, N.W.; and Hollingbourn-castle, Essex.* |
| 1845 | *Major, Richard Henry, Esq. *British Museum, W.C.* |
| 1858 | Malby, John Walter, Esq. 15, *Richmond-villas, Seven-sisters'-rd., Holloway, N.* |
| 1853 | *Malby, Thomas, Esq. 2, *Park-villas, Seven-sisters'-road, Holloway, N.* |
| 1862 | *Malcolm, Capt. Edward Donald, R.E. *Chatham.* |
| 1863 | Malcolm, Jas., Esq. 22, *Prince's-gate, Knightsbridge, W.* |
| 1843 | *Malcolm, W. E., Esq. *Burnfoot, Longholme, near Carlisle.* |
| 1853 | *Mallet, Charles, Esq. *Audit Office, W.C.; and Belmont, Hampstead, N.W.* |
| 1836 | *Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S.W.; and Sedgley-hall, Manchester.* |
| 1830 | *Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter.* |
| 1860 | 1230Mann, James Alexander, Esq., M.R.A.S. *Kensington-palace, W.* |
| 1856 | Manning, Frederick, Esq. *Byron-lodge, Leamington; and* 8, *Dover-street, W.* |
| 1864 | *Mansell, Commander A. L. *H.M.S. 'Hydra;' care of the Hydrographic Office, Admiralty, S.W.* |
| 1859 | Mantell, Wm. Walter, Esq. |
| 1859 | Marett, Charles, Esq., M.A., Barrister-at-Law. 56, *Chancery-lane, W.C.* |
| 1860 | Mariette, Prof. Alphonse, M.A. 27, *St. Stephen's-square, Bayswater, W.* |
| 1850 | *Marjoribanks, Edward, Esq. 34, *Wimpole-street, W.* |
| 1854 | Markham, Clements R., Esq. *India Office, S.W.; and* 21, *Eccleston-sq., S.W.* |
| 1857 | Marlborough, George, Duke of. *Blenheim, Woodstock.* |
| 1854 | Marsden, Rev. J. H. *Great Oakley, near Harwich, Essex.* |
| 1857 | 1240Marsh, Matthew Henry, Esq., M.P. *Oxford and Cambridge Club, S.W.; and* 41, *Rutland-gate, S.W.* |

| Year of Election. | |
|---|---|
| 1862 | Marshall, Capt. J. G. Don. 46, *Gloucester-square, Hyde-park, W.* |
| 1854 | Marshall, Jas. Garth, Esq. *Headingley, nr. Leeds; and Monk Coniston, Ambleside.* |
| 1862 | Marshall, William, Esq. *Oxford and Cambridge Club, S.W.* |
| 1859 | *Marsham, the Hon. Robert. *The Mote, Maidstone, Kent.* |
| 1857 | Marshman, J. C., Esq. 7, *Kensington-palace-gardens, W.* |
| 1857 | Martin, Francis P. B., Esq. |
| 1861 | Martin, Henry, Esq. *Sussex-house, Highbury-new-park, N.* |
| 1860 | *Martin, Richard Biddulph, Esq. 21, *Eaton-square, S.W.* |
| 1862 | Martin, Thomas, Esq. 5, *Compton-terrace, N.* |
| 1865 | 1250Masarvon, Wm. R., Esq. 1, *Gray's-inn-square, W.C.* |
| 1845 | *Matheson, Sir James, Bart., M.P., F.R.S. 13, *Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.* |
| 1858 | Matheson, James Ewing, Esq. 77, *Lombard-street, E.C.; and* 16, *Queen's-gardens, Bayswater, W.* |
| 1857 | *Maughan, Captain P., Indian Navy, F.R.A.S. *Rosneath House, Helensburgh.* |
| 1855 | May, Daniel John, Esq., R.N. *Cape of Good Hope. Care of Cox and Londsdale.* |
| 1858 | Mayer, Joseph, Esq., F.S.A. 68, *Lord-street, Liverpool.* |
| 1861 | Mayers, William S. F., Esq., Interpreter to H.M. Consulate. *Shanghai.* |
| 1862 | Mayne, Captain Richard Charles, R.N. *H.M.S. 'Leopard;' and* 80, *Chester-square, S.W.* |
| 1858 | Mayo, Capt. John Pole. *Army and Navy Club, S.W.* |
| 1863 | Meade, the Hon. Robert Henry. *Foreign Office, S.W.; and* 3, *Belgrave-square, S.W.* |
| 1862 | 1260*Medlycott, Lieut. Mervyn B., R.N. *Care of Messrs. Wood.* |
| 1860 | *Memertzhagen, Daniel, Esq. 10, *Moorgate-street, E.C.; and* 28, *Devonshire-place, Portland-place, W.* |
| 1865 | Meller, Charles James, Esq., M.D. 48, *Queen Anne-street, Cavendish-square, W.* |
| 1854 | Melvill, Col. Sir Peter Melvill, Mil. Sec. to the Bombay Gov. 27, *Palmerston-square, Brighton.* |
| 1838 | Melvill, Philip, Esq., F.R.A.S. *Ethy-house, Lostwithiel, Cornwall.* |
| 1863 | Mercier, Rev. J. J. *St. Mark's College, Chelsea, S.W.* |
| 1842 | *Merivale, Herman, Esq., Under Sec. of State for India. *India Office, Victoria-street, Westminster, S.W.; and* 26, *Westbourne-terrace, W.* |
| 1860 | Michell, Thomas, Esq. *St. Petersburg.* |
| 1863 | *Michie, A., Esq. 26, *Austin Friars, E.C.* |
| 1848 | Middleton, Rear-Admiral Sir C.N. Broke, Bart., R.N. *H.M.S. 'Hero,' Sheerness; and Broke-hall, Suffolk.* |
| 1859 | 1270Miland, John, Esq. *Claireville, London-road, Windsor.* |
| 1860 | Miles, Rev. R. *Bingham, Notts.* |
| 1861 | Miller, George T., Esq. 59, *Portland-place, W.* |
| 1861 | *Miller, Commander Henry Matthew, R.N. *The Grove, Exeter; and Junior United Service Club, S.W.* |
| 1853 | *Miller, Capt. Thos., R.N. *H.M.S. 'Royal George;' and United Service Club, S.W.* |
| 1861 | Milligan, Joseph, Esq. 15, *Northumberland-street, W.C.* |

| Year of Election | |
|---|---|
| 1857 | Mills, Arthur, Esq. 34, *Hyde-park-gardens, W.* |
| 1863 | *Mills, John R., Esq., M.P. *Kingswood-lodge, Englefield-green.* |
| 1854 | Mills, Rev. John. 40, *Lonsdale-square, N.* |
| 1833 | *Milton, Viscount, M.P. 4, *Grosvenor-square, W.* |
| 1860 | 1280Milman, Capt. Everard, Madras Horse Artillery. 9, *Berkeley-square, W.* |
| 1860 | Mitchell, Capt. Alexander, M.P. 6, *Great Stanhope-street, Park-lane, W.* |
| 1862 | *Mitchell, George, Esq. 22, *Bolton-street, Piccadilly, W.* |
| 1864 | Mitchell, J. W., Esq. *Mansfield, Woodhouse, Notts.* |
| 1854 | Mitchell, Thomas, Esq., C.E. *Oldham.* |
| 1859 | Mitchell, William, Esq. 54, *Gracechurch-street, E.C.; and* 6, *Hyde-park-gate, Kensington-gore, W.* |
| 1865 | Mitchell, Wm. H., Esq. *Junior Carlton Club, S.W.; and Lincoln's-inn.* |
| 1851 | *Mocatta, Frederick D., Esq. 35, *Gloucester-place, Portman-square. W.* |
| 1853 | Moffatt, George, Esq., M.P. 103, *Eaton-square, S.W.* |
| 1861 | Mollison, Alexander Fullerton, Esq. 10, *Lansdowne-terrace, Notting-hill, W.* |
| 1861 | 1290Money, Lieut.-Col. George Henry. 9, *Berkeley-street, W.* |
| 1842 | *Montagu, Major Willoughby. *Clapham-common, S.* |
| 1852 | *Montague, Capt. Horace. 24, *Chapel-street, Park-lane, W.* |
| 1842 | *Monteagle, Thomas, Lord, F.R.S. 7, *Park-street, Westminster, S.W.; and Mount Trenchard, Limerick.* |
| 1830 | *Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Grosvenor-gate, Park-lane, W.; and East-cliff-lodge, Ramsgate.* |
| 1859 | Montgomerie, F. Butler, Esq. 2, *Cleveland-row, St. James's, S.W.; and St. Leonard's-on-Sea.* |
| 1864 | Montgomerie, Lieut.-General P. 7, *Queen's-gardens, Hyde-park, W.* |
| 1859 | Montgomerie, Capt. T. G., Beng. Engrs., 1st Assist. Trig. Survey. 73, *St. George's-square, Pimlico, S.W.* |
| 1860 | Montgomery, Robert Mortimer, Esq. 16, *Ulster-place, Regent's-park, N.W.* |
| 1859 | Moody, Lieut.-Colonel R. C., R.E. *British Columbia; and Junior United Service Club, S.W.* |
| 1861 | 1300Moon, Rev. Edward Graham. *Fetcham, Surrey.* |
| 1857 | *Moor, Rev. Allen P., M.A., F.R.A.S. *Sub-Warden St. Augustine College, Canterbury.* |
| 1857 | Moore, Captain John, R.N., C.B. 102, *Piccadilly, W.* |
| 1861 | Moore, John Carrick, Esq. *Corsenall, Wiltonshire; Geological Society, W.C.; and* 23, *Bolton-street, W.* |
| 1857 | Moore, Major-General W. Y. *United Service Club, S.W.* |
| 1853 | More, R. Jasper, Esq., M.P. *Linley-hall, Salop.* |
| 1864 | Morgan, D. L., Esq. *H.M.S. 'Euryalus.'* |
| 1861 | Morgan, Junius Spencer, Esq. 13, *Prince's-gate, Hyde-park, W.* |
| 1861 | Morgan, William, Esq., R.N. *Admiralty-house, Sheerness.* |
| 1839 | *Morris, Charles, Esq. *University Club, S.W.* |
| 1861 | 1310Morrison, Captain Peter. |
| 1863 | Morrison, Col. J. D. 7, *Albemarle-street, W.* |

| Year of Election | |
|---|---|
| 1865 | Morson, T., Esq. 124, *Southampton-row, Russell-square, W.C.* |
| 1861 | Mouat, Frederick J., Esq., M.D., Surgeon-Major and Inspector-General of Prisons, Bengal Army, &c. *Athenæum Club, S.W.; and India.* |
| 1858 | Mudie, Charles Edward, Esq. *The Green, Hampstead, N.W.* |
| 1858 | Mueller, Ferdinand, Esq., M.D., PH. DR. *Director of the Botanical Gardens, Melbourne.* |
| 1862 | Muir, Francis, Esq., LL.D, Surveyor H.M.'s Revenue of Stamps and Taxes. 27, *Great George-street, Westminster, W.* |
| 1855 | Muir, Thomas, Esq. 24, *York-terrace, Regent's-park, N.W.* |
| 1859 | Murchison, Kenneth R., Esq. *Manor-house, Bathford, Bath.* |
| 1830 | *Murchison, Sir Roderick Impey, K.C.B., G.C.St.S., M.A., D.C.L., V.P.R.S., G.S., and L.S., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., *etc. etc.* 16, *Belgrave-square, S.W.; and* 28, *Jermyn-street, S.W.* |
| 1864 | 1320Murchison, Capt. R. M. *Guy-street, Bath.* |
| 1830 | *Murdock, Thomas W. C., Esq. 8, *Park-street, Westminster, S.W.; and River-bank, Putney, S.W.* |
| 1860 | Murray, George J., Esq. *Hook-cottage, Horndean; and Jun. Carlton Club, S.W.* |
| 1844 | *Murray, James, Esq. *Foreign Office, S.W.* |
| 1830 | Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.* |
| 1860 | *Murray, Lt. W., 68th Beng. N. Inf., Topo. Assist. G. Trig. Survey. *Mussoorie, India.* |
| 1865 | Nairne, P. A., Esq. 2, *Grove-hill, Camberwell, S.* |
| 1853 | Napier, Maj.-General Geo. Thomas Conolly, C.B. *Jun. United Service Club, S.W.* |
| 1861 | Napier, William, Esq. |
| 1857 | Napier, Hon. William. 54, *Green-street, Grosvenor-square, W.* |
| 1859 | 1330*Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. *Bhooj, Bombay.* |
| 1861 | Neave, Sir Richard Digby, Bart. *Travellers' Club, S.W.; 78, Eccleston-square, S.W.; and Dagnam-park, Romford, Essex.* |
| 1857 | *Nesbitt, Henry, Esq. *The Terrace, Hackney, N.E.* |
| 1856 | Newman, Thomas Holdsworth, Esq. *Norfolk-street, Park-lane, W.* |
| 1865 | Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 26, *Devonshire-place, Portland-place, W.* |
| 1865 | Nicholson, Lt.-Col. Lothians, R.E. 26, *Suffolk-street, Pall-mall, S.W.; and* 11, *James-street, Buckingham-gate, S.W.* |
| 1861 | *Nichols, Robert C., Esq. 5, *Westbourne-park-place, W.* |
| 1844 | Nicolay, Rev. Chas. Grenfell. *Bahia.* |
| 1836 | Nicolson, Rear-Adm. Sir Frederick Wm. Erskine, Bt., R.N. 15, *William-street, Lowndes-square.* |
| 1864 | Nissen, H. A., Esq. *Mark-lane, E.C.* |
| 1858 | 1340Nix, John H., Esq. 77, *Lombard-street, E.C.* |

| Year of Election. | |
|---|---|
| 1851 | Noel, the Hon. Roden. 11, *Chandos-street, Cavendish-square, W.; and Exton-hall, Oakham, Rutlandshire.* |
| 1857 | *Nolloth, Captain Matthew S., R.N. *Hong-Kong; United Service Club, S.W.; and Peckham, Surrey, S.E.* |
| 1860 | Norris, Harry, Esq. *Colonial Office, S.W.; and 4, Little St. James's-street, S.W.* |
| 1861 | North, Alfred, Esq. *Sidcombe-hall-house, Sidmouth.* |
| 1856 | North, Frederic, Esq. 3, *Victoria-street, Westminster, S.W.; and Hastings-lodge, Hastings.* |
| 1862 | Notman, Henry Wilkes, Esq. 7, *Great Marlborough-street, W.* |
| 1862 | Nourse, Henry, Esq. *Conservative Club, S.W.* |
| 1858 | *Oakeley, R. Banner, Esq. *Oswaldkirk-hall, Yorkshire.* |
| 1863 | O'Callaghan, Chas., Esq., Staff Surgeon. *Kilkenny, Ireland.* |
| 1856 | 1350'Connor, Col. Luke Smyth, C.B., late Governor of the Gambia. *U.S. Club, S.W.* |
| 1858 | Ogilvie, Edward D., Esq. *Fulgilbar, Clarence-river, New South Wales.* |
| 1863 | Ogilvy, Col Thos. 23, *Grafton-st., Piccadilly, W; and Rathven, Forfarsh., N.B.* |
| 1864 | Ogilvy, Thos., Esq. 4, *Park-crescent, Portland-place.* |
| 1859 | Ogle, John W., Esq., M.D. 13, *Upper Brook-street, W.* |
| 1861 | Oldershaw, Capt. Robert Piggott. 74, *Warwick-square, Belgrave-road, S.W.* |
| 1855 | Oliphant, Laurence, Esq., M.P. *Athenæum Club, S.W.; and 2, Berkeley-street, Piccadilly, W.* |
| 1861 | Oliphant-Ferguson, G. H., Esq. *Broadfield-house, Carlisle.* |
| 1845 | *Ommanney, Admi. Erasmus, R.N., F.R.A.S. 6, *Talbot-square, Hyde-park, W.; and United Service Club, S.W.* |
| 1838 | *Ommanney, H. M., Esq. *Blackheath, S.E.* |
| 1864 | 1360'Reily, E., Esq. |
| 1853 | Osborn, Sir George R., Bart. *Travellers' Club, S.W.; and Chicksand-priory, Beds.* |
| 1856 | Osborn, Capt. Sherard, R.N., C.B., Officier de Légion d'Honneur, etc. *Junior United Service Club, S.W.; and Erith, Kent, S.E.* |
| 1861 | Osborn, Capt. Willoughby. *Political Agent, Bhopal, Schira, India.* |
| 1864 | Osborn, Samuel, Esq., M.D. 19, *Manor-terrace, Brixton, S.* |
| 1852 | Oswell, William Cotton, Esq. |
| 1860 | Otter, Charles, Esq. 47, *Montague-square, W.* |
| 1855 | Otway, Arthur John, Esq., M.P. *Army and Navy Club, S.W.* |
| 1860 | *Ouvry-North, the Rev. J. *East Acton, Middlesex, W.* |
| 1844 | *Overstone, Samuel, Lord, M.A., M.R.I. 2, *Carlton-gardens, S.W.; and Wickham-park, Surrey.* |
| 1865 | 1372Owen, H. B., Esq. 30, *Alfred-place, Bedford-square, W.C.* |
| 1846 | *Oxford, Rt. Rev. Samuel Wilberforce, Bishop of, F.R.S., F.S.A. 26, *Pall-mall, S.W.; Cuddesdon-palace, Wheatley, Oxfordshire; and Lavington, Sussex.* |

| Year of Election | |
|---|---|
| 1861 | Page, Thomas, Esq., C.E., F.G.S. 3, *Adelphi-terrace, W.C.; and Tower Cressy, Ashley-road, Bayswater, W.* |
| 1853 | Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, *Eaton-square, S.W.; and Westwood-park, Droitwich, Worcestershire.* |
| 1856 | Palliser, Captain John. *Comeragh, Kilmeaden-house, Waterford; and National Club, Whitehall-gardens, S.W.* |
| 1855 | Palmer, Major Edm., R.A. 7, *Home-park, Stoke, Devonport.* |
| 1862 | Palmer, Rev. Jordan, M.A., F.S.A., Chaplain to St. Ann's Royal society. *Streatham, S.* |
| 1838 | *Palmer, Samuel, Esq. |
| 1863 | *Paris, H.R.H. Le Comte de. *Claremont.* |
| 1849 | *Parish, Capt. John E., R.N. *Army and Navy Club, S.W.* |
| 1833 | 1382*Parish, Sir Woodbine, K.C.H., F.R.S., &c. *Quarry-house, St. Leonard's-on-Sea.* |
| 1864 | Parish, Capt. A. *Chislehurst, Kent.* |
| 1862 | Park, Lieut.-Colonel A., H.M. Indian Army. 41, *Porchester-square, W.* |
| 1862 | Parker, Henry T., Esq. 3, *Ladbroke-gardens, Kensington-park, W.* |
| 1862 | Parker, Robert Deane, Esq. *Union Club, S.W.; and Barham, Canterbury.* |
| 1850 | Parkes, Sir Harry S., C.B., &c. *Oriental Club, W.; and Athenæum Club, S.W.* |
| 1850 | *Parkyns, Mansfield, Esq., F.Z.S. *Arthur's Club, St. James's-street, S.W.; and Woodborough-hall, Southwell.* |
| 1859 | Pasteur, Marc Henry, Esq. 38, *Mincing-lane, E.C.* |
| 1857 | Paton, Andrew A., Esq. *H.B.M.'s Vice-Consul, Missolonghi, Greece.* |
| 1863 | Pattinson, J., Esq. 21, *Bread-street, E.C.* |
| 1858 | 1390Paul, Joseph, Esq. *Ormeside-house, Ryde, Isle of Wight.* |
| 1847 | *Paynter, William, Esq., F.R.A.S. 21, *Belgrave-square, S.W.; and Cumberland-house, Richmond, Surrey, S.W.* |
| 1855 | Peabody, George, Esq. 22, *Old Broad-street, E.C.* |
| 1853 | Peacock, George, Esq. *Starcross, near Exeter.* |
| 1860 | Pearce, Ebenezer John, Esq., PH. DR., Principal of *Great Ealing School, Ealing, Middlesex, W.* |
| 1863 | Pearse, Capt. R. B., R.N. *Arthur's Club.* |
| 1863 | Pearson, Fred., Esq. 13, *Clarendon-square, W.* |
| 1853 | *Peckover, Alexander, Esq. *Wisbeach.* |
| 1860 | *Peek, Henry William, Esq. *Wimbledon-house, S.W.* |
| 1861 | Peel, Archibald, Esq. 8, *St. James's-palace, S.W.* |
| 1858 | 1400Peel, Sir Robert, Bart., M.P. 4, *Whitehall-gardens, S.W.; and Drayton-manor, Tamworth.* |
| 1863 | Pember, Geo. H., Esq. *Leigham-avenue, Streatham, S.* |
| 1859 | *Pennant, George Sholto Douglas, Esq. *Penrhyn-castle, Bangor.* |
| 1863 | *Pennant, Col. S. S. Douglas. *Penrhyn-castle, Bangor, N.B.* |
| 1853 | Percy, Colonel the Hon. Lord Henry M. (Guards). *Northumberland-house.* |
| 1865 | Pereira, Francisco E., Esq. *Care of Messrs. Richardson*, 13, *Pall mall.* |
| 1865 | Perkes, Samuel, Esq., late Hon. E.I.C.S., Bombay, F.G.S., F.Z.S., M.S.A., &c. 72, *Cornhill, E.C.; and Belvedere-house, West Dulwich, S.* |
| 1860 | Perkins, Frederick, Esq. *Mayor of Southampton.* |

| Year of Election. | | |
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| 1860 | | Perowne, Rev. J. J. Stewart. *Divinity and Hebrew Lecturer, St. David's College, Lampeter, S. Wales.* |
| 1859 | | Perry, Sir Erskine, Member Indian Council. 36, *Eaton-place, S.W.* |
| 1859 | 1410 | Perry, William, Esq., H.B.M.'s Consul, Panama. *Athenæum Club, S.W.* |
| 1862 | | *Perry, William, Esq. 9. *Warwick-road, Upper Clapton, N.E.* |
| 1865 | | Perry, G. R., Esq., H.B.M.'s Consul. *Rio Grande do Sul, Brazil.* |
| 1862 | | Peter, John, Esq. |
| 1857 | | *Peters, William, Esq. 35, *Nicholas-lane, Lombard-street, E.C.* |
| 1860 | | Petherick, John, Esq., H.B.M.'s Consul for the Sudan. 2, *North-terrace, Alexandra-square, Brompton, S.W.* |
| 1858 | | Peto, Sir S. Morton, Bart., M.P. 12, *Kensington-palace-gardens, W.* |
| 1861 | | Petrie, Alexander S., Esq. 4, *St. Mark's-square, N.W.* |
| 1860 | | Petrie, Captain Martin, 14th Regiment. *Hanover-lodge, Kensington-park, W.* |
| 1862 | | Peyton, Col. John L. 93, *Great Russell-street, Bloomsbury, W.C.* |
| 1854 | 1420 | Phelps, William, Esq. 18, *Montagu-place, Russell-square, W.C.* |
| 1862 | | Phené, John Samuel, Esq. 34, *Oakley-street, Chelsea, S.W.* |
| 1860 | | Philip, George, Esq. 32, *Fleet-street, E.C.* |
| 1865 | | Philipps, Edward B., Esq. 105, *Onslow-square, S.W.* |
| 1857 | | Phillimore, Capt. Augustus, R.N. 25, *Upper Berkeley-st., W.; and U.S. Club, S.W.* |
| 1859 | | Phillimore, Chas. Bagot, Esq. *India Office, S.W.; and* 25, *Upper Berkeley-st., W.* |
| 1863 | | Phillimore, Sir Robert. 5, *Arlington-street, S.W.* |
| 1860 | | Phillimore, Wm. Brough, Esq., late Capt. Grenadier Guards. 5, *John-street, Berkeley-square, W.* |
| 1830 | | *Phillipps, Sir Thomas, Bart., M.A., F.R.S., F.S.A. *Athenæum Club, S.W.; and Middle-hill, Broadway, Worcestershire.* |
| 1854 | | Phillips, Major-General Sir B. Travell. *United Service Club, S.W.* |
| 1856 | 1430 | Phillips, John, Esq., Solicitor. *Hastings.* |
| 1859 | | Phinn, Thomas, Esq., Q.C. 50, *Pall-mall, S.W.* |
| 1864 | | *Pigou, F. A. P., Esq. 7, *Alexander-terrace, Putney, S.* |
| 1865 | | Pigou, Rev. F., M.A. 14, *Suffolk-street, Pall-mall East, S.W.* |
| 1861 | | Pike, Frederick, Esq. 44, *Charing-cross, S.W.* |
| 1852 | | *Pike, Commander John W., R.N. 26, *Old Burlington-street, W.; Junior United Service Club, S.W.* |
| 1855 | | Pilkington, James, Esq. *Reform Club, S.W.; and Blackburn.* |
| 1851 | | *Pim, Commander Bedford C. T., R.N. *Belsize-square, Hampstead, N.W.; and Senior and Junior United Service Club, S.W.* |
| 1858 | | Pincott, James, Esq. *University College, London, W.C.; and Christchurch-road, Lorpell-park, Brixton-hill, S.* |
| 1859 | | Pinney, Colonel William. 30, *Berkeley-square, W.* |
| 1858 | 1440 | Platen, His Excellency Count. |
| 1865 | | Player, John, Esq. 36, *George-street, Edgbaston, Birmingham.* |
| 1860 | | Playfair, Lieut.-Col. Robert Lambert. *Political Agent, Zanzibar.* |
| 1860 | | Plowden, Charles Hood C., Esq. 15, *York-street, Portman-square, W.* |
| 1856 | | *Plowes, John Henry, Esq. 39, *York-terrace, Regent's-park, N.W.* |

Year of Election.

1862 Pollard, Commander Edwin John, R.N.

1855 *Pollexfen, Capt. J. J. *Indus.*

1837 Pollington, John Charles George, Viscount, F.R.A.S. *Meshley-park, near Leeds.*

1853 Pollock, General Sir George, G.C.B. *Clapham-common, Surrey, S.*

1835 *Ponsonby, Hon. Frederick G. B. 3, *Mount-street, Grosvenor-square, W.*

1860 1452Pook, Captain John. 6, *Coffe's-cottas, Lewisham-hill, S.E.*

1857 Pope, Captain Wm. Agnew. 52, *Charles-street, Berkeley-square, W.*

1863 *Porcher, Commander Edwin A., R.N. 50, *Montagu-square, W.*

1853 Porter, Edwd., Esq. *Athenæum Club, S.W.; and* 26, *Suffolk-street, Pall-mall, S.W.*

1864 Portugal, Chev. Joaquim de.

1861 *Pounden, Captain Lonsdale. *Junior United Service Club, S.W.; and Brownswood, Co. Wexford.*

1862 Povah, Rev. John V., M.A. 16, *Tavistock-square, W.C.*

1852 Powell, Lewis, Esq. *Port Louis, Mauritius.*

1864 *Powell, F. S., Esq., M.P. 1, *Cumberland-square, Hyde-park, W.*

1859 Power, E. Rawdon, Esq. 15, *Adam-street, Adelphi, W.C.*

1854 1460Power, John, Esq. 3, *Grove-terrace, St. John's-wood, N.W.*

1854 Power, John Arthur, Esq., M.A., F.M. 52, *Burton-crescent, W.C.*

1864 Powis, the Hon. E. R.

1864 Powys, Hon. Leopold. 17, *Montagu-street, Portman-square, W.*

1864 Powys, Hon. C. J. F. *Barracks, Mullingar.*

1860 Pratt, Hodgson, Esq.

1853 Price, Jas., Esq., M.D., F.R.C.S., &c. *Brixton, Surrey, S.*

1852 Price, James Glenie, Esq., Barrister-at-Law. 14, *Clement's-inn, W.C.*

1859 Price, Major R. Havard, 31st Bengal N. Infantry. *Bengal.*

1860 *Prickett, Rev. Thomas William, M.A., F.S.A. *University Club, S.W.*

1855 1472*Pringle, Thomas Young, Esq. 14, *Eaton-square, S.W.*

1845 Primsep, Henry T., Esq. *Little Holland-house, Kensington, W.*

1859 Pritchard, Wm. Thos., Esq. *H.B.M.'s Consul, Fiji.*

1861 *Prodgers, Rev. Edwin. *The Rectory, Ayott St Peter's, Herts.*

1852 Prout, John William, Esq., M.A., Barrister-at-Law. *Athenæum Club, S.W. and Newsham, Mobberley, N.W.*

1862 *Puget, Capt. J. *8th Hussars, Aldershot.*

1860 Puller, Arthur Giles, Esq. *Athenæum Club, S.W.; and Youngsbury, Ware.*

1857 Purcell, Edward, Esq., LL.D. 2, *Maze-hill, Greenwich, S.E.*

1859 Purdon, Wm. H., Esq. *Executive Engineer, Punjab.*

1864 Quicke, W. F., Esq. *King's Lodge College, High-street, Exeter.*

1861 1480Quin, Lord George. 15, *Belgrave-square, S.W.*

1862 Quin, John Thos., Esq. *Metropolitan Training College, Highbury-park, North, N.*

1854 *Quin, Admiral Michael. *Senior United Service Club, S.W.; and* 18, *Albion-villas, Albion-road, Islington, N.*

| Year of Election. | |
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| 1858 | *Radstock, Granville Augustus, Lord. 30, *Belgrave-square, W.* |
| 1862 | *Rae, James, Esq. 32, *Phillimore-gardens, Kensington, W.* |
| 1853 | Rae, John, Esq., M.D. 4, *Fenchurch-street, E.C.; Canada; and* 4, *Belgrave-road, Eccleston-square, S.W.* |
| 1862 | Ramsay, George D., Esq. *War Office, S.W.* |
| 1851 | *Ramsay, Rear-Admiral Wm., C.B., F.R.A.S. *Junior United Service Club, S.W.; and* 23, *Ainslie-place, Edinburgh.* |
| 1864 | Ranyard, A. C., Esq. 13, *Hunter-street, W.C.* |
| 1862 | Rasch, F., Esq. 30, *Cumberland-square, Hyde-park, W.* |
| 1859 | 1490Ratcliff, Charles, Esq., F.S.A. *National Club, S.W.; Edgbaston, Birmingham; and Downing College, Cambridge.* |
| 1861 | Rate, Lachlan Macintosh, Esq. 9, *South Audley-street, W.* |
| 1846 | Ravenshaw, E. C., Esq., M.R.A.S. *Oriental Club, W.; and* 36, *Eaton-sq., W.* |
| 1859 | Ravenstein, Ernest G., Esq. *Topographical Depôt, Spring-gardens, S.W.* |
| 1865 | Rawlings, Thos., Esq. *Hampton-mills, Pembridge-place, Bayswater, W.* |
| 1861 | Rawlinson, Sir Christopher. *United University Club, S.W.* |
| 1844 | *Rawlinson, Maj.-General Sir Henry C., M.P., K.C.B., D.C.L., F.R.S. *Athenæum Club, S.W.; and* 1, *Hill-street, Berkeley-square, W.* |
| 1838 | Rawson, His Excellency Rawson Wm., C.B., Colonial Secretary. *Bahamas.* |
| 1863 | Reade, W. Winwoode, Esq. *Conservative Club.* |
| 1865 | Redhead, R. Milne, Esq. *Springfield, Scedley, Manchester.* |
| 1857 | 1500Reed, William, Esq. *Oak-lodge, Addison-road, Kensington, W.* |
| 1861 | *Reid, David, Esq. 95, *Piccadilly, W.* |
| 1858 | Rees, L. E. R., Esq. *Indus; care of Messrs. Horsburgh and Co., 16, Mincing-lane, E.C.* |
| 1859 | Reeve, John, Esq. *Conservative Club, S.W.* |
| 1863 | Reeves, H. W., Esq. |
| 1856 | Reid, Henry Stewart, Esq. *Bengal Civil Service.* |
| 1857 | Reid, Lestock R., Esq. *Athenæum Club, S.W.; and* 122, *Westbourne-ter., W.* |
| 1861 | Reid, William, Esq., C.E. 27, *Cholcot-villas, Haverstock-hill, N.W.* |
| 1861 | Reilly, Anthony Adams, Esq. *Belmont, Mullingar.* |
| 1830 | *Rennie, George, Esq., C.E., F.R.S., Hon. M.R.I.A. 4, *Prince's-terrace, Prince's-gate.* |
| 1830 | 1510*Rennie, Sir John, C.E., F.R.S., F.S.A. 32, *Charing-cross.* |
| 1834 | *Rennie, M. B., Esq., C.E. 22, *Portman-street, Portman-square, W.* |
| 1864 | Rennie, W., Esq. 14, *Hyde-park-square, W.* |
| 1830 | *Renouard, Rev. George Cecil, B.D., M.R.A.S. *Swanscombe-rectory, near Dartford.* |
| 1830 | *Renwick, Lieutenant, R.E. |
| 1861 | Reuter, Julius, Esq. 1, *Royal Exchange-buildings, E.C.* |
| 1858 | Reynardson, Henry Birch, Esq. *Adwell, near Tetsworth, Oxfordshire.* |
| 1857 | Richards, Capt. George H., R.N. *Hydrographer to the Admiralty, S.W.* |
| 1860 | Richards, the Rev. George, D.D. |
| 1864 | Richardson, F., Esq. *Park-lodge, Blackheath-park.* |

| Year of Election | |
|---|---|
| 1862 | 1522Richardson, Mark, Esq., late Beng. Med. Staff. 95, *Inverness-terrace, W.* |
| 1863 | Rickard, Major F. I., Government Inspector of Mines, Argentine Republic. 1, *George-street, Mansion-house, E.C.* |
| 1859 | Ricketts, Edward Henry, Esq. *Drayton-house, West Drayton, Middlesex.* |
| 1862 | Riddell, Henry P. A. Buchanan, Esq. *The Palace, Maidstone, Kent.* |
| 1865 | Ridout, W. J., Esq. 12, *Wellington-street, Strand, W.C.* |
| 1864 | Ridley, F. H., Esq. 19, *Bloomfield-road, Maida-hill, W.* |
| 1864 | Ridley, George, Esq. 2, *Charles-street, Berkeley-square, W.* |
| 1862 | *Rigby, Col. Christopher Palmer, C.B., H.M.B. Consul, *Zanzibar; and Oriental Club, W.* |
| 1862 | Rigby, Joseph D., Esq. *Kew-green, Surrey, W.* |
| 1860 | Rintoul, Robert, Esq. *Windham Club, S.W.* |
| 1863 | 1530Ritchie, John, Esq. 22, *Blessington-road, Lee, Kent.* |
| 1840 | *Robe, Maj.-General Fred. Holt, C.B. *U. S. Club, S.W.; and* 5, *Palace gardens-terrace, Kensington, W.* |
| 1862 | Roberts, Arthur, Esq. *Ormond-house, A, Old Kent-road, S.E.* |
| 1864 | Roberts, R. W., Esq., B.A. *Travel. Emigrat. Colonial.* |
| 1861 | Roberts, Capt. E. Wynne. *The Knowle, Redhill.* |
| 1845 | Robertson, A. Strutt, Esq., M.D. *Horwich, near Bolton.* |
| 1860 | Robertson, D. Brooke, Esq., H.B.M.'s Consul. *Canton.* |
| 1861 | *Robertson, Graham Monro, Esq. 21, *Cleveland-square, Hyde-park, W.* |
| 1863 | Robertson, R. B., Esq. *H.M.'s Legation, Yokohama, Japan.* |
| 1853 | Robinson, Albert, Esq., C.E. 35, *Great George-street, Westminster, S.W.* |
| 1860 | 1542Robinson, Benjamin Coulson, Esq. 8, *King's-bench-walk, Temple, E.C.; and* 43, *Mecklenburgh-square, W.C.* |
| 1830 | *Robinson, R.-Admi. Charles G., R.N. *Pool-cottage, St Mary's-terr., Maida-hill.* |
| 1859 | Robinson, Capt. D. G. *Staff of the Great Trigonometrical Survey, Rawul Pindi, Punjab.* |
| 1863 | Robinson, Geo. M., Esq. 5, *Paragon, Southwark, S.* |
| 1864 | Robinson, H. D., Esq. 12, *Leadenhall-street, E.C.* |
| 1864 | Robinson, H. O., Esq. 12, *Leadenhall-street, E.C.* |
| 1865 | Robinson, J. R., Esq. *South-terrace, Dewsbury.* |
| 1859 | Robinson, Sir Hercules G. P. *Governor of Hong-Kong.* |
| 1862 | Robinson, Lieut.-Col. Sir John Stephen, Bart. *Roley-hall, Dunleer, Ireland; Arthur's Club, S.W.; and* 16A, *Park-lane, W.* |
| 1864 | Robinson, John, Esq. *Natal.* |
| 1855 | 1552Robinson, Thos. Fleming, Esq., F.L.S. *Carlton-villa, South Norwood, S.* |
| 1850 | *Robinson, Walter F., Esq., Commander R.N. 2, *Camden-crescent, Bath.* |
| 1858 | Roche, Antonin, Esq. *Educational Institute, Cadogan-gardens, Sloane-st., S.W.* |
| 1830 | *Rodd, James Rennell, Esq. |
| 1860 | Roe, John Septimus, Esq., Surveyor-General, Western Australia; *and Messrs. Stilwell, Arundel-street, Strand, W.C.* |
| 1860 | Rogers, Henry Darwin, Esq. *Professor of Natural History, College, Glasgow.* |
| 1863 | Rogers, John T., Esq. *River-hill, Sevenoaks, Kent.* |

| Year of Election | |
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| 1839 | *Roget, Peter M., Esq., M.D., F.R.S. 18, *Upper Bedford-place, Russell-sq., W.C.* |
| 1861 | Rokeby, Lieut. Langham, R.M. *Conservative Club, S.W.; and R. M. Barracks, Chatham.* |
| 1861 | Rollo, Lord. 18, *Upper Hyde-park-gardens, W., and Dumcrieff-castle, Moffat, N.B.* |
| 1863 | 1560Rönn, M. Herman von. 21, *Kensington-park-gardens, W.* |
| 1834 | *Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, *Hyde-park-gardens, W.; and* 25, *Southampton-buildings, Chancery-lane, W.C.* |
| 1861 | Rose, Jas. Anderson, Esq. *Wandsworth, Surrey, S.W.; and* 11, *Salisbury-st., W.C.* |
| 1857 | *Rose, Wm. A., Esq., Alderman. 63, *Upper Thames-street, E.C.; and Befions, Crawford.* |
| 1864 | Ross, B. R., Esq. *Care of the Hudson-bay Company, Hudson-bay-house, Fenchurch-street, E.C.* |
| 1857 | Ross, John, Esq., M.A. 2, *Brabant-court, Philpot-lane, E.C.* |
| 1863 | Ross, Wm. Andrew, Esq. 7, *Albemarle-street, W.* |
| 1844 | *Rosse, William, Earl of, M.A., F.R.S. *Birrcastle, Parsonstown, King's County, Ireland.* |
| 1864 | *Roundell, C. S., Esq. 54, *Davies-street, Berkeley-square, W.* |
| 1862 | Roupell, Robert Priolo, Esq., M.A., Q.C. 13, *Park-lane, W.* |
| 1839 | 1570*Rous, Vice-Admiral the Hon. Henry John. 13, *Berkeley-square, W.* |
| 1864 | Routh, E. J., Esq. *St. Peter's College, Cambridge.* |
| 1862 | Rowe, Sir Joshua, C.B., late Chief Justice of Jamaica. 10, *Queen Anne-street, Cavendish-square, W.* |
| 1863 | Rowley, Commr. C., R.N. 48, *Onslow-square, Brompton, S.W.* |
| 1856 | Rucker, J. Anthony, Esq. *Blackheath, S.E.* |
| 1861 | *Rumbold, Charles James Augustus, Esq. *Downing College, Cambridge; and* 5, *Percival-terrace, Brighton.* |
| 1861 | Rumbold, Thomas Henry, Esq. 1, *Eccleston-square, S.W.* |
| 1860 | Rumley, Major-General Randall, Vice-President Council of Military Education. 12, *Cadogan-place, S.W.* |
| 1858 | *Russell, Arthur John Edward, Esq., M.P. 2, *Audley-square, W.* |
| 1830 | *Russell, Jesse Watts, Esq., D.C.L., F.R.S. |
| 1830 | 1580Russell, John, Earl, F.R.S. 37, *Chesham-place, S.W.; Pembroke-lodge, Richmond, S.W.; Endsleigh-ho., Devon; and Gart-ho., near Callander, N.B.* |
| 1830 | Russell, Wm. Howard, Esq., LL.D. 18, *Sumner-place, Onslow-square, S.W.* |
| 1860 | Rutherford, John, Esq. 2, *Cavendish-place, Cavendish-square, W.* |
| 1857 | *Ryder, Capt. Alfred P., R.N. *U.S. Club, S.W.; and Lamule-abbey, Uppingham.* |
| 1864 | Ryder, G., Esq. 10, *King's Bench-walk, Temple, E.C.* |
| 1852 | Sabine, Major-General Edw., R.A., Pres. R.S., F.R.A.S., &c. &c. 13, *Ashley-place, Victoria-street, Westminster, S.W.; and Woolwich, S.E.* |
| 1847 | St. Asaph, Rt. Rev. Thos. Vowler Short, Bishop of. *Palace, St. Asaph, N. Wales.* |
| 1857 | St. David's, Connop Thirlwall, Bishop of. *Abergwilly-palace, Carmarthen.* |
| 1863 | St. George, Maj.-Gen. J. 17, *Rutland-gate, S.W.* |

| Year of Election. | |
|---|---|
| 1863 | St. John R. H. St. Andrew, Esq., 60th Rifles. |
| 1862 | 1590St. John, Spenser, Esq., Chargé d'Affaires, Port-au-Prince, Hayti. 28, *Grove-road, St. John's-wood, N.W.* |
| 1857 | St. Vincent, Edward, Viscount. *Mertford, Stone, Staffordshire.* |
| 1863 | Sale, Lieut., M.T., R.E. *Rugby.* |
| 1845 | *Salomons, David, Esq., M.P., Alderman, F.R.A.S. 26, *Great Cumberland-place, Hyde-park, W.; and Broom-hill, near Tunbridge-wells.* |
| 1863 | *Salt, Henry, Esq. 29, *Gordon-square, W.C.* |
| 1861 | Salting, William Severin, Esq. 24, *St. James's-street, S.W.* |
| 1861 | *Sandbach, Wm. Robertson, Esq. 19, *Prince's-gate, Hyde-park, S.W.* |
| 1862 | Sanford, Major Henry Ayshford. 26, *Grosvenor-place, W.; and Nynehead-court, Wellington, Somerset.* |
| 1863 | Santos, Le Chev. G. dos. 12, *Gloucester-place, Portman-square, W.* |
| 1860 | Sarel, Lieut.-Colonel H. A., 17th Lancers. *Army and Navy Club, S.W.; and Shanghae.* |
| 1862 | 1620Sargood, F. J., Esq. *Moorgate-street-buildings, E.C.* |
| 1860 | Sartoris, Alfred, Esq. 64, *Rutland-gate, S.W.* |
| 1852 | Saumarez, Captain Thomas, R.N. *The Firs, Jersey.* |
| 1864 | Saurin, Admiral E. *Prince's-gate, S.W.* |
| 1863 | Sawyer, Col. Charles, 6th Dragoon Guards. *Heywood-lodge, Maidenhead.* |
| 1863 | Sayer, Captain Frederick. *Gibraltar; and Manor-house, Richmond, S.* |
| 1838 | Scarlett, Lieut.-General the Hon. Sir J. Yorke, K.C.B. *Portsmouth.* |
| 1865 | Sercombe, Edwin, Esq. 49, *Brook-street, Grosvenor-square, W.* |
| 1861 | Schenley, Edward W. H., Esq. 14, *Prince's-gate, S.W.* |
| 1859 | Scott, Lord Henry, M.P. 37, *Belgrave-square, S.W.* |
| 1861 | 1610*Scott, Hercules, Esq. *Brotherton, near Montrose, N.B.* |
| 1855 | Scott, Admiral Sir James, K.C.B. *United Service Club, S.W.* |
| 1864 | Scott, John, Esq. 3, *Chester-place, Hyde-park, W.* |
| 1863 | Scovell, George, Esq. 34, *Grosvenor-place, S.W.* |
| 1840 | *Scrivener, J. F. P., Esq. 20, *Brunston-square, W.; and Romridge-house, near Andover, Hants.* |
| 1861 | Seawright, James, Esq. *Bedford-hill, Balham, S.* |
| 1830 | *Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. *Athenæum Club, S.W.; and Cambridge.* |
| 1862 | Seemann, Berthold, Esq., PH. DR., F.L.S. 22, *Canonbury-square, N.* |
| 1858 | *Serocold, Charles P., Esq. *Brewery, Liquorpond-street, E.C.* |
| 1853 | Sevin, Charles, Esq. 155, *Fenchurch-street, E.C.* |
| 1853 | 1620Sewell, Henry, Esq. 15, *Copthall-court, Throgmorton-street, E.C.; and Stamford-hill, N.* |
| 1858 | Seymour, George, Esq. 17, *Gracechurch-street, E.C.; and 12, Sussex-square, Hyde-park, W.* |
| 1855 | Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, *Eaton-square, S.W.* |
| 1853 | *Seymour, Henry Danby, Esq., M.P. *Brooks's Club, St. James's-street, S.W.; Knoyle-Hundon, Wilts; and Glastonbury, Somersetshire.* |

| Year of Election. | |
|---|---|
| 1854 | *Shadwell, Captain Charles F. A., R.N., C.B. *Royal Naval Hospital, Haslar, Gosport.* |
| 1860 | *Shadwell, Lieut.-Colonel Lawrence. |
| 1861 | Shaffner, Col. Taliaferro P., U.S. 62, *Moorgate-street, E.C.*; 49, *Weymouth-street, Portland-place, W.*; *and Louisville, Kentucky, U.S.* |
| 1856 | *Share, James Masters, Esq., R.N. *H.M.S. 'Meander';* and *Front-street, Tynemouth, Northumberland.* |
| 1861 | Sharp, Peter, Esq. *Oakfield, Ealing, W.* |
| 1861 | *Sharpe, William John, Esq. 1, *Victoria-street, Westminster, S.W.*; *and Norwood, Surrey, S.* |
| 1862 | 1630*Shaw, John, Esq. *Fincmd, Otago, New Zealand.* |
| 1854 | Shaw, John Ralph, Esq. *Sand-hey, Hoghlake, Birkenhead.* |
| 1861 | Shea, John, Esq., M.D., Surgeon R.N. 84, *Blackfriars-road, S.* |
| 1858 | Shetheld, George A. F. C., Earl of. 20, *Portland-pl., W.*; *and Sheffield-pk., Sussex.* |
| 1846 | Sheil, Major-Gen. Sir Justin, K.C.B. 13, *Eaton-place, Belgrave-square, S.W.* |
| 1857 | Shephard, Chas. Douglas, Esq., Surg. R.N. *Harewood-hall, near Cheadle, Staffords.* |
| 1861 | Shepherd, Rev. Edwd. John, M.A. *Trottescliffe, Kent*; *and Athenæum Club, S.W.* |
| 1861 | Sherer, John, Esq. |
| 1860 | Sheridan, H. Brinsley, Esq., M.P. *Bellefield-house, Parson's-green, Fulham, S.W.* |
| 1860 | Sheridan, Richd. B., Esq., M.P. 48, *Grosvenor-place, S.W.* |
| 1863 | 1640Sherrin, Joseph Samuel, Esq., LL.D., PH. DR. *Leyton-house, Leyton-crescent,* |
| 1857 | *Kentish-town, N.W.* |
| 1859 | *Sherwill, Lt.-Col. W. S., F.G.S. *Prof. of Surveying, Civil Engr. College, Calcutta*; *and Perth, N.B.* |
| 1858 | *Shipley, Conway M., Esq. *Army and Navy Club, S.W.*; *and Raheny, Dublin.* |
| 1862 | Showers, Lieut.-Col. Charles S. *Coe's-hotel, Jermyn-street, S.W.* |
| 1856 | Shuttleworth, Sir J. P. Kay, Bart. 38, *Gloucester-square, W.*; *and Gawthorpe-hall, Burnley, Lancashire.* |
| 1859 | Silver, the Rev. Fred., M.A., F.R.A.S. *Norton-rectory, Market Drayton, Salop.* |
| 1859 | *Silver, Stephen Wm., Esq. 66, *Cornhill, E.C.*; *and Norwood-lodge, Lower Norwood, S.* |
| 1853 | Silver, William, Esq., M.A., Barrister-at-Law. *Park-house, Park-lane, Croydon, S.* |
| 1869 | Sim, John Coysgame, Esq. 13, *James-street, Buckingham-gate, S.W.* |
| 1853 | 1650Simmons, Edward R., Esq., Barrister-at-Law. *Ellerslie, Chichester.* |
| 1848 | Simmons, Colonel John L. A., R.E., C.B. *H. B. M.'s Consul, Warsaw*; *United Service Club, S.W.* |
| 1853 | Simpkinson, Lieut. Francis G., R.N. 55, *Victoria-street, Westminster, S.W.* |
| 1864 | Simpson, Frank, Esq. 17, *Whitehall-place.* |
| 1862 | Simpson, Henry Bridgeman, Esq. 44, *Upper Grosvenor-street, W.* |
| 1861 | Simpson, James, Esq., C.E., F.R.S. 29, *Great George-street, Westminster, S.W.* |
| 1863 | *Simpson, Wm., Esq. 64, *Lincoln's-inn-fields, W.C.* |
| 1865 | Sinclair, Major A. Y. *Cavendish-house, Upper Teddington, Middlesex*; *and East India United Service Club, S.W.* |

| Year of Election | |
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| 1857 | Sitwell, Major W. H. *Junior United Service Club, S.W.* |
| 1858 | Skelmersdale, Edward, Lord. *Lathom-park, Ormskirk, Lancashire.* |
| 1853 | 1662Skrine, Hy. D., Esq. *Warleigh-manor, near Bath.* |
| 1861 | Sladen, Rev. Edward Henry Manwaring. *Alton, near Marlborough, Wilts.* |
| 1861 | Sligo, G. J. Browne, Marquis of. 14, *Mansfield-st., W.; and Westport, Co. Mayo.* |
| 1860 | *Smith, Augustus Henry, Esq. *Flexford-house, Guildford.* |
| 1855 | Smith, Rev. Brownrigg, M.A. *Shepherd-lane, Brixton, S.* |
| 1859 | Smith, Edward, Esq. *Dublin Castle.* |
| 1853 | Smith, George, Esq. *Penn.* |
| 1857 | Smith, George R., Esq. 73, *Eaton-square, S.W.; and Telsden-park, Surrey.* |
| 1865 | Smith, Guilford, Esq. 63, *Cheapside, S.W.* |
| 1861 | Smith, H. S. Dazley, Esq., M.A. *United University Club, S.W.* |
| 1857 | 1670*Smith, Horace, Esq. *Bourbourne-borough, Hailsham.* |
| 1830 | *Smith, James, Esq., F.R.S.L. & E. *Athenæum Club, S.W.; & Jordan-hill, Glasgow.* |
| 1861 | Smith, Jervoise, Esq. 47, *Belgrave-square, S.W.* |
| 1854 | Smith, John, Esq., Memb. Geograph. Soc. Bombay. 27, *Prince's-gate, S.W.* |
| 1853 | Smith, John Harrison, Esq. 49, *Inverness-terrace, W.* |
| 1853 | Smith, John Henry, Esq. 1, *London-street, E.C.; and Purley, Croydon, Surrey.* |
| 1861 | Smith, J. Sidney, Esq., Barrister-at-Law. *Sidney-lodge, Wimbledon-common, S.W.* |
| 1861 | *Smith, Joseph Travers, Esq. 25, *Throgmorton-street, E.C.* |
| 1858 | *Smith, Octavius Henry, Esq. *Thames-bank, Westminster, S.W.* |
| 1857 | Smith, Captain Philip, Grenadier Guards. |
| 1841 | 1680*Smith, Thomas, Esq. |
| 1860 | Smith, William, Esq., C.E. 19, *Salisbury-street, Strand, W.C.* |
| 1859 | *Smith, W. Castle, Esq. 1, *Gloucester-terrace, Regent's-park, N.W.* |
| 1857 | Smith, Wm. Gregory, Esq. *Hudson-bay Company, Fenchurch-street, E.C.* |
| 1859 | Smith, William Henry, Esq. 1, *Hyde-park-street, W.* |
| 1857 | *Smyth, Rear-Adm. William, R.N. *Richmond-house, Ryde, Isle of Wight.* |
| 1850 | *Smythe, Colonel William J., R.A. |
| 1863 | Snowden, Francis, Esq., M.A. 1, *Dr. Johnson's-buildings, Temple, E.C.* |
| 1861 | Soldin, Don Mariano Felipe Paz. *Line; and 21A, Hanover-square, W.* |
| 1839 | *Somers, Charles, Earl. 35, *Prince's-gate, S.W.; Lustwr-castle, Herefordshire; and The Priory, Reigate, Surrey.* |
| 1862 | 1690Somerset, Capt. Leveson E. H., R.N. *Southgate, near Leighton-Buzzard; care of Messrs. Cleard, 3, Clement's-inn, Fleet-street, E.C.* |
| 1858 | *Somes, Joseph, Esq. *Fortismere, Muswell-hill, N.* |
| 1855 | Sopwith, Thos., Esq., M.A., C.E., F.R.S. 103, *Victoria-street, Westminster, S.W.* |
| 1845 | *Sotheby, Lt.-Col. Fred. S., C.B., F.R.A.S. 3, *Portugal-street, Grosvenor-sq., W.* |
| 1861 | South, John Flint, Esq. *Bladdlestrop-park, S.E.* |
| 1860 | Southesk, James Carnegie, Earl of. *Kinnaird-castle, Brechin, N.B.* |
| 1853 | Southey, Henry Sedgfield, Esq., Barrister-at-Law. *Athenæum Club, S.W.* |
| 1860 | *Southey, Jas. Lowther, Esq. *Care of Messrs. Stilwell.* |
| 1863 | Spickernell, Dr. Geo. E., Principal of Eastman's Royal Naval Establishment. *Eastern-parade, Southsea.* |

| Year of Election | |
|---|---|
| 1861 | Spofforth, Markham, Esq. 3, *Porchester-terrace, W.* |
| 1830 | 1700*Spottiswoode, A., Esq. 12 *James-street, Buckingham-gate.* |
| 1855 | *Spottiswoode, William, Esq., F.R.S. 50, *Grosvenor-place, S.W.* |
| 1859 | *Spratt, Capt. Thos. A. B., R.N., C.B. *Mount Ephraim, Tonbridge-wells, Kent.* |
| 1857 | Spring-Rice, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Mount Trenchard, Foynes, Ireland.* |
| 1859 | Stanford, Edward W., Esq. *Colonial Secretary of New Zealand; care of Mr. J. S. Tytler, 19, Castle-street, Edinburgh.* |
| 1853 | Stanford, Edward, Esq. 6, *Charing-cross, S.W.* |
| 1855 | Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. 3, *Grosvenor-place-houses, Grosvenor-place, S.W.; and Chevening, Sevenoaks, Kent.* |
| 1860 | *Stanhope, Walter Spencer, Esq. *Cannon-hall, Barnsley, Yorkshire.* |
| 1856 | Staniland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.* |
| 1856 | Stanley, Edmund Hill, Esq. *Craven-hotel, Strand, W.C.* |
| 1853 | 1710*Stanley, Edward Henry, Lord, M.P., D.C.L. 23, *St. James's-square, S.W.* |
| 1863 | Stanton, Geo., Esq. *Coton-hill, Shrewsbury; and Conservative Club, S.W.* |
| 1856 | Statham, John Lee, Esq. 60, *Wimpole-street, W.* |
| 1863 | *Staveley, Miles, Esq. *Old Slenningford-hall, Ripon.* |
| 1858 | Staveley, Thos. G., Esq. *Foreign Office; and 24, Cambridge-st., Hyde-park, W.* |
| 1850 | Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square, S.W.* |
| 1830 | *Stephen, Sir George. *Melbourne; care of Mr. H. W. Ravenscroft, 7, Gray's-inn-square, W.C.* |
| 1857 | Stephenson, Sir R. Macdonald, C.E. 6, *Upper Hyde-park-gardens, W.; and East-cottage, Worthing.* |
| 1860 | Sterling, Col. Sir Anthony. *The White Cottage, South-pl., Knightsbridge, W.* |
| 1862 | Sterry, Henry, Esq. 7, *Paragon, Southwark, S.E.* |
| 1854 | 1720Stevens, Frederic Perkins, Esq. *Melbourne, Australia.* |
| 1855 | Stevens, Henry, Esq., F.S.A. 4, *Trafalgar-square, Charing-cross. W.C.* |
| 1841 | Stevenson, Thomas, Esq., F.S.A. 37, *Upper Grosvenor-street, W.* |
| 1861 | Stewart, Alex. Jas. Robt., Esq. 12, *Belgrave-square, S.W.; and Ards-house, Donegal.* |
| 1860 | *Stewart, Major J. H. M. Shaw, Royal Madras Engineers. |
| 1860 | Stewart, Major Patric, Bengal Engineers. |
| 1865 | *Stewart, John, Esq. *Junior Carlton Club, S.W.; and Nately-hall, Lancashire.* |
| 1860 | Stirling, Capt. Frederick Henry, R.N. *H.M.S. 'Hero.'* |
| 1860 | *Stirling, William, Esq. 128, *Park-street, Grosvenor-square, W.* |
| •1860 | Stirling, Sir Walter, Bart. 36, *Portman-square, W.* |
| 1860 | 1730Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.* |
| 1845 | *Stokes, Rear-Admiral John Lort, R.N. *United Service Club, S.W.; and Scotchwell, Haverfordwest, Wales.* |
| 1858 | Stopford, James Sydney, Esq. 18, *Savile-row, W.* |
| 1861 | Strange, Lieut.-Col. Alexander. 41, *Brompton-crescent, S.W.* |
| 1858 | Strangford, Percy Ellen, Viscount. 58, *Cumberland-street, W.* |

| Year of Election | |
|---|---|
| 1858 | Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.* |
| 1860 | Stratheden and Campbell, Wm. F. Campbell, Lord. *Bruton-street, Bond-street, W.* |
| 1864 | Straton, N. D. J., Esq. *Aylestone, Leicester.* |
| 1860 | Strickland, Edward, Commissary-General. *Barbadoes, W. Indies.* |
| 1865 | Strong, F. K., Esq., K.H. *Homburg, Germany; care of A. Strong, Esq., 43, Lincoln's-inn-fields, W.C.* |
| 1853 | 1740Strutt, George H., Esq., F.R.A.S. *Southampton.* |
| 1858 | Strutt, Captain Hammel Ingold, F.R.A.S. |
| 1859 | *Strutt, Captain William. 26, *Richmond-place, Southampton.* |
| 1853 | *Strzelecki, Count P. E. de, C.B., F.R.S. 23, *Savile-row, W.* |
| 1859 | Stuart, Lieut.-Col. J. F. Dudley Crichton, M.P., Grenadier Guards. 25, *Wilton-crescent, Belgrave-square, S.W.* |
| 1861 | Stuart, Vice-Chancellor Sir John. 11 *and* 12, *Old-buildings, Lincoln's-inn, W.C.*, 5, *Queen's-gate, Hyde-park, W.; and Grushernish, Isle of Skye, Invernesshire.* |
| 1834 | *Sturge, Thomas, Esq. *Northfleet, Kent.* |
| 1853 | Stutt, Capt. Charles, F.L.S. *St. Edmond's, Tivoli, Cheltenham.* |
| 1862 | Stuttfield, William, Esq. 15, *Leinster-terrace, Hyde-park, W.; and Mystoke-park, Canterbury.* |
| 1858 | Sudeley, Lord. 5, *Seamore-place, Curzon-street, W.* |
| 1857 | 1750Sullivan, Captain Bartholomew J., R.N., C.B. *Board of Trade, S.W.* |
| 1860 | Sullivan, John W., Esq. 11, *Home-park, Stoke, Devonport.* |
| 1862 | Surridge, Henry Arthur Dillon, Esq., B.A. 31, *Lower Grosvenor-street, W.* |
| 1862 | Surtees, Capt. Charles Frevile, M.P. *Chalcott-house, Long Ditton, Surrey.* |
| 1861 | *Sutherland, George Granville William, Duke of. *Stafford-house, St. James's Palace, S.W.* |
| 1856 | Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. *Junr. U.S. Club, S.W. Chesterfield-house, Weymouth; and the Royal Yacht, Portsmouth.* |
| 1840 | *Sutherland, Robert, Esq. *Carmona Bank, Dunoon, Argyleshire.* |
| 1864 | Swamy, Mutu C., Esq. *Athenæum Club.* |
| 1857 | Swanzy, Andrew, Esq. 38, *Cannon-street, E.C.* |
| 1857 | *Sweeting, Robert, Esq. 32, *Nicholas-lane, Lombard-street, E.C.; and London-hill, Harrow.* |
| 1836 | 1760*Swinburne, Rear-Admiral Charles H. 18, *Grosvenor-place, W.; and Capheaton, near Newcastle-upon-Tyne.* |
| 1862 | *Swinburne, Lieut. Sir John, Bart., R.N. *Capheaton, Newcastle-on-Tyne.* |
| 1863 | Swinhoe, Robert, Esq., H.B.M. Consul, Formosa. *Care of Messrs. Smith, Elder, and Co.* |
| 1859 | Sykes, Christopher, Esq., M.P. *Sledmere, Malton.* |
| 1851 | Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. *Athenæum Club, S.W.; and* 47, *Albion-street, Hyde-park, W.* |
| 1864 | Symonds, F., Esq., M.D. *Beaumont-street, Oxford.* |
| 1852 | *Synge, Col. Millington H., R.E. *Canada.* |

| Year of Election. | |
|---|---|
| 1852 | Tagart, Courtenay, Esq. *Reform Club, S.W.; and Paris.* |
| 1859 | Tagart, Francis, Esq. 31, *Craven-hill-gardens, Hyde-park, W.* |
| 1864 | Tait, P. M., Esq. 162, *Adelaide-road, N.: and Oriental Club, W.* |
| 1857 | 1770*Tait, Robert, Esq. 14, *Queen Anne-street, W.* |
| 1861 | Talbot de Malahide, Lord. *Malahide Castle, Co. Dublin.* |
| 1861 | Tayler, Joseph Walter, Esq. 1, *Oak-villas, Acton, Middlesex, W.* |
| 1861 | Taylor, Commander A. Dundas, R.N. 6, *Nightingale-road, Lower Clapton, N.E.* |
| 1865 | Taylor, H. L., Esq. *Reform Club, S.W.; and* 32, *Phillimore-gardens, Kensington, W.* |
| 1854 | *Taylor, John Stopford, Esq., M.D. 1, *Springfield, St. Anne-street, Liverpool.* |
| 1863 | Taylor, John, Esq. 1, *Leadenhall-street, E.C.; and Egremont-villa, Lower Norwood, Surrey, S.* |
| 1863 | Taylor, John, Esq. *Adelaide, Australia.* |
| 1863 | Tayler, Col. R. C. H. *Sandy Lee: and Carlton Club, S.W.* |
| 1864 | Taylor, W. R., Esq. |
| 1857 | 1780Teesdale, John M., Esq. *Eltham-house, Eltham, S.E.* |
| 1863 | Tegg, Wm., Esq. 13, *Dought-street, Mecklenburg-square, W.C.* |
| 1860 | Templeton, John, Esq. 24, *Budge-row, E.C.* |
| 1857 | Tennant, Professor James. 149, *Strand, W.C.* |
| 1859 | Tennant, Major J. F., Bengal Engrs. *Director of the Observatory, Madras.* |
| 1830 | *Thatcher, Colonel, E.I.C. |
| 1865 | Theed, William F., Esq. *Campden-lodge, Kensington, W.* |
| 1861 | Theobald, James, Esq., M.A. *Royal Thames Yacht Club, Wormwood-street, W.; and Grays, Essex.* |
| 1863 | Thomas, G., Esq. *Queen's-gardens-terrace, Hyde-park, W.* |
| 1854 | Thomas, Henry Harrington, Esq. *Lansdowne-crescent, Bath.* |
| 1864 | 1790Thomas, J. R., Esq., Staff Assist. Surg. *Castle-hill, Fishguard, Pembrokeshire.* |
| 1859 | Thompson, Thomas A., Esq. |
| 1854 | Thompson, William C., Esq. |
| 1863 | Thomson, James, Esq. *Motcombe-house, East Molesey.* |
| 1863 | Thomson, James Duncan, Esq., Portuguese Consul. *St. Peter's-chambers, Cornhill, E.C.* |
| 1848 | *Thomson, J. Turnbull, Esq. *Chief Surveyor, Otago, New Zealand.* |
| 1861 | *Thomson, Ronald Ferguson, Esq, 1st Attache to the Persian Mission. *Clifford-inn, Fleet-street, E.C.* |
| 1854 | *Thomson, Thomas, Esq, M.D. *Hope-house, Kew, W.* |
| 1865 | Thomson, W. T., Esq. 21, *James-street, Buckingham-gate, S.W.* |
| 1862 | *Thorne, Augustus, Esq. 4, *Cullum-street, City, E.C.* |
| 1847 | 1800Thornton, Rev. Thomas Cooke, M.A., M.R.I. *Brock-hall, near Weedon, Northamptonshire.* |
| 1858 | Thorold, Rev. A. W. 16, *Bedford-square, W.C.* |
| 1854 | Thorold, Henry, Esq. *Cuxwold, Lincolnshire.* |
| 1861 | Thrupp, John, Esq. |
| 1859 | Thuillier, Lt.-Colonel H. L., Surveyor-General of India. *Calcutta.* |

| Year of Election. | |
|---|---|
| 1865 | Thurburn, C. A., Esq. 29, *Queensborough-terrace, Kensington-gardens, W.* |
| 1861 | Thurburn, Capt. Henry. 5, *Queensborough-terrace, Bayswater, W.* |
| 1864 | *Thurburn, Hugh, Esq. 108, *Westbourne-terrace, W.* |
| 1861 | Thurlow, the Hon. Thos. J. Hovell. *British Embassy, Paris.* |
| 1846 | *Tindal, Charles John, Esq. *New South Wales.* |
| 1839 | 1810*Tinne, John A., Esq. *Bridley, Aigburth, near Liverpool.* |
| 1862 | Todd, John, Esq. *Sydney.* |
| 1865 | Todd, Rev. John W. *Tylor-hill, Forest-hill, Sydenham, S.* |
| 1853 | *Tomlin, George Taddy, Esq., F.S.A. *Combe-house, Buttonfields, Canterbury; and Windham Club, S.W.* |
| 1853 | Tomline, George, Esq., M.P. 1, *Carlton-house-terrace, S.W.* |
| 1835 | *Tooke, Arthur Wm., Esq., M.A. *Pinner-hill-house, near Watford, Middlesex.* |
| 1864 | Tottenham, Rev. John W., B.A. *Queen-square, St. Leonard's-on-sea, Sussex.* |
| 1856 | Torrance, John, Esq. 5, *Chester-place, Hyde-park-square, W.* |
| 1859 | Twnsend, John, Esq., Lieut. R.N. *Lodge, Westonsuper-Mare.* |
| 1846 | *Towry, George Edward, Esq. |
| 1858 | 1826Towson, J. Thomas, Esq. *Secretary Land Marine Board, Liverpool.* |
| 1864 | *Toynbee, Capt. Hy. *Commanding the East-India Ship 'Hotspur.'* |
| 1863 | *Tozer, Rev. H. F., M.A. *Exeter College, Oxford.* |
| 1864 | Tracy, the Hon. C. H. 11, *George-street, W.* |
| 1863 | *Travers, Arch., Esq. 4, *Cornwall-villas, Finchley-new-road, N.W.* |
| 1862 | Travers, Franklin, Esq. *Cavendish Club, W.* |
| 1860 | Travers, John Ingram, Esq. *Wroxhambe, near Tiverton.* |
| 1859 | Tremlett, Rev. Francis W., M.A. *Belsize-park, Hampstead, N.W.* |
| 1865 | *Trench, Capt. the Hon. Le Poer, R.E. 32, *Hyde-park-gardens, W.; and Ordnance Survey Office, Pimlico, S.W.* |
| 1863 | Trestrail, Rev. Frederick. *Somerville, Redhill, Upper Norwood, S.* |
| 1862 | 1830Trevelyan, Sir Charles Edward, K.C.B. 8, *Grosvenor-crescent, S.W.* |
| 1830 | Trevelyan, Sir Walter Calverly, Bart., M.A., F.S.A., F.L.S., F.R.S.N.A., &c. *Athenæum Club, S.W.; Wallington, Northumberland; and Nettlecombe, Somerset.* |
| 1860 | Trigg, John Davies, Esq. *Magdalen Hall, Oxford.* |
| 1864 | Trimmer, Edmund, Esq. *Care of Messrs. Trimmer and Co., New City-chambers, Bishopsgate-street, E.C.* |
| 1858 | Trotter, Alexander, Esq. *Devonshire-place-house, New-road, N.W.* |
| 1862 | Tuckett, Francis Fox, Esq. *Frenchay, near Bristol.* |
| 1835 | *Tuckett, Frederick, Esq. 4, *Mortimer-street, Cavendish-square, W.* |
| 1865 | Tuckett, Philip D., Esq. 113, *Piccadilly, W.* |
| 1852 | Tudor, Edward Owen, Esq., F.S.A. 46, *Westbourne-terrace, W.* |
| 1857 | Tudor, Henry, Esq. 46, *Westbourne-terrace, W.* |
| 1862 | 1840Tuke, Harrington, Esq., M.D. 37, *Albemarle-street, W.* |
| 1864 | Turnbull, George, Esq., C.E., F.R.A.S. 39, *Craven-hill-gardens, W.* |
| 1834 | *Turnbull, Rev. Thomas Smith, F.R.S. *University Club, S.W.; and Blofield, Norfolk.* |
| 1863 | Turner, Thos., Esq. *Guy's Hospital, Southwark, S.* |

| Year of Election. | |
|---|---|
| 1864 | *Twentyman, A. C., Esq. *Tettenhall-wood, near Wolverhampton.* |
| 1863 | Twentyman, Wm. H., Esq. *Manor-house, St. John's-wood, N. W.* |
| 1865 | *Twiselton, Hon. E. F. *Rutland-gate, S.W.* |
| 1849 | Twiss, Travers, Esq., D.C.L., F.R.S. 19, *Park-lane, W.* |
| 1858 | Twyford, Capt. A. W., 21st Hussars. 108, *Cambridge-st., Warwick-sq., S.W. Cavalry Depôt, Canterbury; Reform Club, S.W.; and Clayton Wickham, Horstpierpoint, Sussex.* |
| 1865 | Tyer, Edward, Esq., C.E., F.R.A.S. 15, *Old-jewry-chambers, E.C.* |
| 1862 | 1850Tyler, Edward Burnet, Esq. *Linden, Wellington, Somerset.* |
| 1862 | *Tyler, George, Esq. 24, *Holloway-place, Holloway-road, N.* |
| 1859 | Tytler, Capt. W. Fraser. *Aldourie, Inverness.* |
| 1862 | Underhill, Edward Bean, Esq. 13, *Camden-square, Camden-town, N.W.* |
| 1861 | Ussher, John, Esq. *Arthur's Club, St. James's Street, S.W.* |
| 1858 | *Uzielli, Theodosius, Esq. 114, *Piccadilly, W.* |
| 1844 | *Vacher, George, Esq. *Manor-house, Teddington.* |
| 1862 | *Vander Byl, P. G., Esq. 3, *Upper Hyde-park-gardens, W.* |
| 1865 | Vane, G., Esq. *Ceylon.* |
| 1858 | Vardon, Arthur, Esq. *Worth, Crawley, Sussex.* |
| 1857 | 1860Vardon, Thomas, Esq. *Library, House of Commons, Palace, Westminster, S.W.* |
| 1856 | *Vaughan, James, Esq., F.R.C.S., Bombay Army. *Builth, Breconshire.* |
| 1861 | Vaughan, J. D., Esq., Assist. Res. Councillor and Police Magistrate of Singapore. |
| 1861 | Vaughan, Nash Vaughan Edwards, Esq. *Rhcola, near Neath; and Lanelay, near Pontyfield, Glamorganshire.* |
| 1849 | Vaux, William S. W., Esq., M.A., F.S.A. *British Museum, W.C.* |
| 1852 | *Vavasour, Sir Henry M., Bart. 8, *Upper Grosvenor-street, W.* |
| 1855 | Vavasseur, James, Esq. 2, *De Crespigny-park, Denmark-hill, S.* |
| 1860 | Verbeke, Frederick, Esq. 41, *Victoria-street, Westminster, S.W.* |
| 1863 | *Vereker, the Hon. H. P., LL.D., H.M. Consul at Rio Grande do Sul. 1, *Portman-square, W.* |
| 1862 | Verner, Edward Wingfield, Esq., M.P. 86, *Eaton-square, S.W.; and Cook-abbey, Bray, Co. Wicklow.* |
| 1862 | 1870Verney, Lieut. Edmond H., R.N. *H.M.S. 'Grappler.'* |
| 1837 | *Verney, Major Sir Harry C., Bart., M.P., F.R.A.S. *Travellers' Club, S.W.; 32, South-street, Grosvenor-square, W.; and Claydon-house, Bucks.* |
| 1857 | Verrey, Charles, Esq. |
| 1852 | Verulam, James Walter, Earl of. *Gorhambury, near St. Albon's; Barry-hill, Surrey; and Messing-hall, Essex.* |
| 1859 | Vesey, Arthur, Esq. *Long Ditton, Kingston, Surrey, S.W.* |
| 1830 | Vetch, Captain James, R.E., F.R.S. 48, *Finchley-road, St. John's-wood, N.W.* |
| 1865 | Vile, Thomas, Esq. 75, *Oxford-terrace, W.* |

| Year of Election | | |
|---|---|---|
| 1865 | | Vincent, Minos C., Esq., C.E. 22, *Grafton-street East, W.C.; and Frankfort, Ohio, U.S.* |
| 1857 | | Vincent, John, Esq. 4, *Granville-park, Blackheath, S.E.* |
| 1858 | | Vines, William Reynolds, Esq., F.R.A.S. 4, *Thavies-inn, Holborn-hill, E.C.* |
| 1863 | 1880 | Vivian, Major Quintus, late 8th Hussars. 17, *Chesham-street, S.W.* |
| 1838 | | *Vyvyan, Sir Richard Rawlinson, Bart., F.R.S. *Trelowarren, Cornwall.* |
| 1852 | | Wade, Mitchell B., Esq. 66, *South John-street, Liverpool.* |
| 1864 | | Wade, R. B., Esq. 58, *Upper Seymour-street, Portman-square, W.* |
| 1863 | | Wade, Thos. F., Esq., C.B., H.B.M. Secretary of Legation. *Pekin, China.* |
| 1853 | | *Wagstaff, William Racster, Esq., M.D., M.A. |
| 1863 | | Waite, Henry, Esq. 3, *Victoria-street, Pimlico, S.W.* |
| 1864 | | Wakefield, E. T., Esq. 40, *Pembridge-villas, Bayswater, W.* |
| 1862 | | Walker, Col. C. P. Beauchamp, C.B., Assist. Quartermaster-Gen., Shorncliffe. 97, *Onslow-square, S.W.; and United Service Club, S.W.* |
| 1860 | | Walker, David, Esq., M.D., F.L.S., M.R.I.A. |
| 1861 | 1890 | Walker, Edward Henry, Esq., Vice-Consul at Tripoli. *Norton-bank, Chester.* |
| 1863 | | *Walker, Frederick John, Esq. *Thornbury-house, Thornbury, Bristol.* |
| 1863 | | Walker, James, Esq., Managing Director of Madras Railway. 23, *Cambridge-square, Hyde-park, W.* |
| 1859 | | *Walker, Lt.-Col. James, Bombay Engineers. *Murree, near Rawul Pindé, Punjab.* |
| 1830 | | Walker, John, Esq., Hydrog. India Office. 9, *Castle-street, Holborn, W.C.* |
| 1861 | | *Walker, John, Esq. 60, *Porchester-terrace, W.* |
| 1858 | | *Walker, Captain John, H.M.'s 66th Foot. 13, *Westbourne-st., Hyde-park, W.* |
| 1864 | | Walker, R. B. N., Esq. |
| 1860 | | Walker, Robert, Esq., M.D., Ass. Surg. R.N. *Carradale Lodge, near Campbeltown, Argyleshire.* |
| 1861 | | *Walker, T. F. W., Esq. |
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| 1853 | | Walter, Henry Fraser, Esq. *Papplewick-hall, near Nottingham.* |
| 1865 | | Walton, H. C., Esq., C.E. 26, *Savile-row, W.* |

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1863 Wylde, W. H., Esq. *Foreign Office, S. W.*

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| 1854 | Yeats, John, Esq., LL.D. *Clayton-place, Peckham, S.E.* |
| 1861 | York, Most Rev. William Thomson, Archbishop of. *Bishopsthorpe, York.* |
| 1859 | Yorke, Lieut.-General Sir Charles, K.C.B. 19, *South-st., Grosvenor-square, W.* |
| 1830 | *Yorke, Colonel Philip J., F.R.S. 89, *Eaton-place, S.W.* |
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| 1857 | *Young, Capt. Allen. *Riversdale, Twickenham, S.W.* |
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| 1865 | Young, R. R., Esq., B.A. |
| 1857 | Yule, Col. Henry, Bengal Engineers. *Messrs. Grindlay & Co., 55, Parliament-street, S.W.* |
| 1865 | Yule, Rev. J. W. *Alexandria, Egypt.* |
| 1864 | Zwecker, J. B., Esq. 37, *Torrington-avenue, Camden-road, N.W.* |

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| HALLE AND LEIPZIG | German Oriental Society |
| JENA . . . . . | University of |
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## NAMES OF INDIVIDUALS TO WHOM THE ROYAL PREMIUMS HAVE BEEN AWARDED.

1831.—Mr. Richard Lander, for the discovery of the course of the River Niger or Quorra, and its outlet in the Gulf of Benin.

1832.—Mr. John Biscoe, for the discovery of the land now named "Enderby Land" and "Graham Land," in the Antarctic Ocean.

1833.—Captain Sir John Ross, R.N., for discovery in the Arctic Regions of America.

1834.—Sir Alexander Burnes, for the navigation of the River Indus, and a journey by Balkh and Bokhara, across Central Asia.

1835.—Captain Sir George Back, R.N., for the discovery of the Great Fish River, and its navigation to the sea on the Arctic Coast of America.

1836.—Captain Robert FitzRoy, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.

1837.—Colonel Chesney, R.A., for the general conduct of the "Euphrates Expedition" in 1835-6, and for accessions to the geography of Syria, Mesopotamia, and the Delta of Susiana.

1838.—Mr. Thomas Simpson—Founder's Medal—for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.

——— Dr. Edward Rüppell—Patron's Medal—for his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.

1839.—Col. H. C. Rawlinson, E.I.C.—Founder's Medal—for his travels and researches in Susiana and Persian Kurdistán, and for the light thrown by him on the comparative geography of Western Asia.

——— Sir R. H. Schomburgk—Patron's Medal—for his travels and researches during the years 1835-9 in the colony of British Guayana, and in the adjacent parts of South America.

1840.—Lieut. Raper, R.N.—Founder's Medal—for the publication of his work on 'Navigation and Nautical Astronomy.'

——— Lieut. John Wood, I.N.—Patron's Medal—for his survey of the Indus, and re-discovery of the source of the River Oxus.

1841.—Captain Sir James Clark Ross, R.N.—Founder's Medal—for his discoveries in the Antarctic Ocean.

——— Rev. Dr. E. Robinson, of New York—Patron's Medal—for his work entitled 'Biblical Researches in Palestine.'

1842.—Mr. Edward John Eyre—Founder's Medal—for his explorations in Australia.

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YATES, J.—Account of a Volume containing portions of Ptolemy's Geography. 4to. 1864. The AUTHOR.

ZIEGLER, J. M.—Hypsometrie der Schweiz. 8vo. Zurich, 1853. Sir R. I. MURCHISON, K.C.B.

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Carte Générale du Sud de l'Algérie; dressée au Bureau Topographique d'Alger, par ordre de M. le Général Comte Randon, Gouverneur-Général de l'Algérie. Paris, 1855. On 2 sheets. Scale 1: 800,000.

Carte Spéciale de la Kabylie, comprenant le Territoire soumis à la France. Par M. le Général Comte Randon, Gouverneur-Général dans la Campagne de 1857. Dépôt de la Guerre. Paris, 1858. On 6 sheets. Scale 1: 50,000.

Carte des Parties Centrales du Sahara, indiquant les Relations du Soudan avec nos Possessions du Sénégal et l'Algérie; dressée au Bureau Topographique d'Alger. Par le Chef d'Escadron d'Etat Major Péraud. Dépôt de la Guerre. Paris, 1862. Scale, 1: 5,000,000

Carte de l'Afrique sous la Domination des Romains; dressée au Dépôt de la Guerre, d'après les travaux de M. Fr. Lacroix, par le Capitaine d'État Major Nau de Champlouis. Par ordre de S. E. le Maréchal Comte Randon, Ministre de la Guerre. Paris, 1864. On 2 sheets. Scale 1: 2,000,000. Accompanied by a Book.

By the FRENCH GOVERNMENT, through the Ministre de la Guerre, M. Chasseloup-Laubat.

MOROCCO—

Karte zur Uebersicht der Reisen von G. Rohlfs in Marokko, 1861-4. By A. Petermann. Gotha, 1865. Scale 1: 1,000,000, or 1 inch = 15¾ miles. A. PETERMANN, Esq.

EASTERN—

Original Karte der Nord-Abessinischen Grenzlande: Bogos, Mensa, Marea, &c., &c. Deutschen Expedition unter v. Heuglin, Kinzelbach, Munzinger und Steudner, 1861. Entworfen von A. Petermann. Scale 1: 500,000, or 1 inch = 7·89 miles. A. PETERMANN.

Original Karte von Hamasen, Sarae, Adiabo, &c., in Nord-Abessinien, &c., &c. Th. v. Heuglin, Werner Munzinger, A. d'Abbadie, &c. Entworfen von A. Petermann. Scale 1: 500,000, or 1 inch = 7·89 miles.

Sources of the Nile: Sketch of a Map of the Countries between Lake Rek and the Dembo River, by the Expedition under the care of Madame Tinne. Scale 1 inch = 11¾ miles (Geo.).

Sources of the Nile: A Tracing of a Map of Consul Petherick's Explorations in the White Nile from Aliab to Gondokoro.

A Manuscript Map of the Routes in Eastern Africa between Zanzibar, the Great Lakes and the Nile, explored and surveyed by Captain J. H. Speke, 1857-1863. Scale 1 degree = 3 inches.

The FAMILY of CAPTAIN SPEKE.

*Maps, Charts, &c.* *Donors.*

Tracing of the Sources of the Nile, adapted from Captain Speke's Map, by Captain R. F. Burton. Scale 1 inch = 190 miles (Stat.).

Das Gebiet der Schneeberge Kilima-Ndscharo und Kenia, in Ost Afrika. Scale 1 : 1,500,000. B. Hassenstein. Gotha, Justus Perthes. 1864. A. PETERMANN.

Rough Sketch of the Rovuma River. By Dr. Kirk. Scale 1 inch = 5 miles (Geo.). The AUTHOR.

Lake Nyassa and River Shire, copied from a MS. lent by Dr. Kirk. Scale 1 inch = 10 miles (Geo.). DR. J. KIRK

SOUTH—

Map of the Colony of Natal, surveyed by Captain Grantham, R.E., &c., 1861. Lithographed at the Topographical Department of the War Office. On 4 sheets.

Map of the Zulu Country, compiled from information obtained by J. Walmsley, Esq., Government Agent, Natal, 1864.

## AMERICA.

ARCTIC—

Map of the Countries round the North Pole. By J. Arrowsmith. 1859. The AUTHOR.

Sir John Franklin's Arctic Discoveries between Baffin Bay and Cape Bathurst, combined with those of Sir Edward Parry in 1819, and the several Searching Expeditions; concluding with that of Sir F. L. McClintock, in 1859. Constructed by J. Arrowsmith. 1860. The AUTHOR.

Chart exhibiting Discoveries of the American Arctic Expedition in search of Sir John Franklin: with the revised Survey of the Greenland Coast. This is the original Chart by Dr. Kane. SIR R. I. MURCHISON, K.C.B.

Tracing of Part of Greenland Coast, extending from Cape York to Hakluyts Island. Drawn by Kalahuevooa *alias* Erasmus York, partly from his own observations, and partly from report. Adm. E. OMMANNEY, R.N.

UNITED STATES—

Map of Part of Virginia, Maryland, and Pennsylvania. Scale 1 inch = 65 miles. By the Topographical Depôt, War Office. 1864.

A Map of the Neighbourhood of Richmond and Petersburg, Virginia. Scale 1 inch = 1 mile. Topographical Depôt, War Office. 1864. Through Sir E. LUGARD, K.C.B.

MEXICO—

Essai d'une Carte Ethnographique du Mexique. Par V. A. Malte Brun. Paris, 1864. The AUTHOR.

CENTRAL—

Carte de Yucatan et des Régions Voisines. Pouvant servir aux Explorations dans ce Pays. Par V. A. Malte Brun. Paris, 1864. The AUTHOR.

SOUTH—

Karte der Südlichen Provinzen der Argentinischen Republik. By Dr. H. Burmeister. Scale 1 inch = $28\frac{1}{2}$ miles (Geog.). Capt. J. E. PARISH, R.N.

Registro Grafico de las Propiedades Rurales de la Provincia de Buenos Aires. Construido por el departamento topografico y publicado con autorizacion del Superior Gobierno de la Provincia, 1864. Saturnino

*Maps, Charts, &c.* *Donors.*

Salas, Mariano Moreno, German Kuhr. Pedro Benoit. Ygnacio Casagemas. Antonio E. Malaver. 3 sheets only. Scale 1 inch = 5·94 miles (Geog.). DON SATURNINO SALAS, through Capt. Parish, R.N.

Republic of Ecuador, showing the Area of Denouncements, &c. Scale 1 inch = 66½ miles.

Kaart van de Kust van Guijana, van Cajenne tot Demerarij, met bijzondere Plans van de Rivieren Suriname, Coppename, Corantijn en Nickerie. Lieut. J. Vos. Amsterdam, 1845. Accompanied by a Book.
Mr. LOWRY.

New Granada. Map of the Country between Pasto and Bogota, including the region of the Pitayo Chinchona. Scale 1 inch = 18 miles.
E. WELLER, Esq.

Peru. By Paz Soldan. The AUTHOR.

## AUSTRALIA.

Australia. On 2 sheets. Constructed and engraved by W. and A. K. Johnston. Edinburgh, 1864. The AUTHORS.

Explorations in Western Australia. By C. C. Hunt. 1864. Fremantle, 1865. 2 copies. Scale 1 inch = 12 miles Stat.).
Capt. ROE, R.N., Surveyor-General.

## TASMANIA.

Tasmania, West. Nach Charles Gould, U. A. By A. Petermann. Scale 1: 500,000 or 1 inch = 7·9 miles. Gotha, 1865. The AUTHOR.

## NEW ZEALAND.

New Zealand. On 2 sheets. Constructed and engraved by W. and A. K. Johnston. Edinburgh, 1864. The AUTHORS.

The Islands of New Zealand, from the Admiralty Surveys, &c.. &c. J. Wyld, Esq. 1864. The AUTHOR.

Map of Part of the Northern Island of New Zealand, showing the Scene of the Military Operations of 1863-4. Compiled at the Topographical Depôt War Office. Col. Sir H. James, R.E., Director.
WAR OFFICE, through SIR H. James, R.E., Director.

Map of the Northern Portion of the Province of Auckland. Prepared at the Waste Land Department by J. L. Toole, Chief Draughtsman. Scale 1 inch = 2 miles.
Mr. C. DALDY, 1, Broad-street-buildings, Agent for the Colony of New Zealand.

Map of the Middle Portion of the Province of Auckland. Prepared at the Waste Land Department by J. L. Toole, Chief Draughtsman. Scale 1 inch = 2 miles.

North Island: Entrances to Manukau Harbour. Surveyed by Commander Sydney, R.N. 1856.
COLONIAL OFFICE, through the Duke of Newcastle.

## ANTARCTIC.

Two MS. Tracings, showing the tracks of H.M.S. 'Terror' and 'Erebus.' in the Antarctic Regions. Scale 1 inch = 1 degree Eq.
Commander J. E. DAVIS, R.N.

## MISCELLANEOUS.

*Maps, Charts, &c.* — *Donors.*

Uebersicht der in Petermann's Geograph Mittheilungen, 1855 bis 1864, enthaltenen Karten. A. von Petermann. Gotha, 1865. — The Author.

Four Panoramic Diagrams illustrative of the Ice-bergs and Ice-barriers, and of the Discoveries in the Antaretic Regions under Sir J. C. Ross, R.N. 1841. — Commander J. E. Davis, R.N.

Australia: Two Pen-and-ink Sketches. By Zakaduna, an Australian Native. — Mrs. G. H. Poole.

London: Meteorological Diagram, showing the daily Elements throughout the Year 1864. By C. O. F. Cator. — The Author.

The Result of Petherick's Observations. 1 sheet of foolscap. Computed by Mr. Duncan, of the Observatory, Greenwich.

India: View of the Inlet Tower, with a portion of the principal Dam of the Vehar Reservoir of the Bombay Waterworks, as it appeared prior to the admission of the water; with the Town and Harbour of Bombay in the Distance. Engineer, Henry Conybeare, Esq., F.G.S., M.I.C.E. — Sir R. I. Murchison, K.C.B.

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## CHARTS.

Admiralty—

*Section* 1.

No. 531 Loch Moidart (Scotland, West Coast).
1167 Burry Inlet (England, West Coast).
1607 River Thames. Sheet 2.
2385 Scotland, West Coast. Sheet 10.
2832 Treshnish Point to the entrance of Mull Sound Scotland, West Coast).
2858 Cleddau River from Pembroke Dockyard to Haverfordwest (Wales).

*Section* 3.

No. 2327 Norway, South Coast. Sheet 1.

*Section* 5.

No. 189 Pizzolongo Point to Marsala (Sicily, West Coast).
241 Garnah Island to Derneh (Tripoli).
374 Ras Bulaou to Alexandria (Africa, North Coast).
524 New Mole, Gibraltar.
562 Port of Valencia (Spain, East Coast).
1450 Corfu Road.
1591 Prevesa Strait (Ionian Sea).
1762 Zante Bay (Ionian Sea).
1888 Stampalia Island (Mediterranean).
2634 Ras en Nakura to El Arish (Syria).

*Section* 6.

No. 325 River St. Mary, between Lake Huron and Lake Superior.
332 Lake Erie.
341 Ram Island to Port Metway (Nova Scotia).
352 Bay of Fundy. Sheet 1.
376 Broyle Harbour to Renewse Harbour (Newfoundland).
490 Lake Erie, West end.
519 Lake Huron.
520 Trinity Harbour (Newfoundland).

*Maps, Charts, &c.* *Donors.*

2915 Bay Bulls to Placentia (Newfoundland).
2916 La Poile Bay (Newfoundland).
2917 Good Bay and St. John's Harbour (Newfoundland).
2918 Port Saunders, Keppel and Hawke Harbours.

*Section* 8.

No. 391 Baxo Nuevo or New Bore (West Indies).
487 St. Christopher and Nevis, Eustatius and Saba.
501 Kingstown, Greathead, and Calliaqua Bays.

*Section* 9.

No. 550 San Francisco River entrance (Brazil).
888 Rio Mossoro to Touro Point (Brazil).
889 Touro Point to Formosa (Brazil).
890 Formosa to Pernambuco (Brazil).
891 Pernambuco to Maceio (Brazil).
892 Maceio to Rio de San Francisco (Brazil).
904 Abrolhos Rocks (Brazil).

*Section* 10.

No. 570 Quatsino Sound (Vancouver Island).
572 Constance Cove (Vancouver Island).
573 Nanaimo Harbour (Vancouver Island).
576 Victoria and Esquimalt Harbours (Vancouver Island).
577 Inner Channels between Juan de Fuca and Haro Strait.
581 Johnstone and Broughton Straits (Vancouver Island).
582 Goletas Channel to Quatsino Sound (Vancouver Island).

*Section* 11.

No. 2536 African Coast from Jibul Jarne to Sayara.
1001 St. Louis or Guet-n-dar Anchorage (Senegal).
2776 River Kwara. Sheet 3.

*Section* 13.

No. 358 The Western Coast of Kiusiu and Nipon, including Tsu-sima (Japan).
362 Pratas Reef and Island (China Sea).
857 Wei-hai or Kyau-Chau Bay.
966 Dalawan Bay (China Sea).
1602 Yang-tse-Kiang entrance.
1764 Amoy Inner Harbour (China).
1995 Singapore Roads.
2432 Peter the Great, Posiette, Amur, and Usouri Bays (Russian Tartary).
2773 St. Vladimir Bay (Gulf of Tartary).

*Section* 14.

No. 1028 Port Stephens to Port Korogoro (Australia, East Coast).
1031 Great Sandy Strait (Northern Entrance).
1117 Manukau Harbour (New Zealand).
1704 Adelaide River entrance.
2731 Geelong Harbour.

*Section* 15.

No. 2867 Fanning Island (North Pacific).

*Section* 16.

*See* Accessions to Library.

The Hydrographic Office.

French—

No. 1995 Plan des Baies de Cabral et de Santa Cruz (Brésil).
1996 Plan du Mouillage des Hots, Abrolhos (Brésil).
1997 Carte de la Côte Occidentale d'Amérique, comprise entre le Port de San Diego et le Golfe de Tehuantepec.

*Maps, Charts, &c.* *Donors.*

1998 Carte de l'Amérique Septentrionale (Côte Orientale), comprise entre la Baie de Gaspé et New York.
1999 Ports et Mouillages de la Mer de Marmara.
2000 Ile Poros (Grèce, Morée).
2001 Iles Petali (Grèce).
2002 Iles Saros et Port de Baklar (Archipel).
2003 Ile de Syra (Archipel).
2004 Baie de Gavrion (Archipel, Andros).
2005 Sigri (Mitylène) Kastro (Lemnos Island).
2006 Chesmeh (Détroit de Scio).
2007 Ile de Palawan (Mer de Chine).
2008 Port Résolution (Tanna, New Hebrides).
2009 Baie Vila (Ile Vata, New Hebrides).
2010 Carte Particulière de la Côte du Brésil, sheet 3, comprise entre Benevente et Barra Secca.
2011 Yedi Atla et Port Deremen (Gulf of Kos, Asia Minor).
2012 Cap Krio, et Rade et Ville de Kos (Archipel).
2013 Entrée du Détroit de Scio, Ports Egrylar, Mersin et Sikia (Asia Minor).
2014 Boudroum (Asia Minor).
2015 Canal Santa Barbara (Détroit de Magellan).
2016 Plan du Port du Cap Frio (Côte du Brésil).
2017 Iles Shehr Oghlan et Port de Gallipoli (Asia Minor).
2018 Partie de la Carte des Iles Sercq, Herm et Guernesey.
2019 Partie de la Carte de l'Ile Jersey.
2020 Port de Rhodes (Ile de Rhodes).
2021 Carte du Bassin compris entre la Sardaigne, l'Italie et la Sicile.
2022 Ports et Mouillages de la Côte Ouest de Patagonie.
2030 Baie des Eléphants (Benguella).
2031 Carte Particulière de la Côte du Brésil, 1re feuille, Partie comprise entre le Cap Frio et le Cap St. Thomé.
2032 Archipel des Nouvelles Hébrides (Océan Pacifique Sud).
2033 Grabusa, Port Lutro, Kutri, Port de Rhithmno (Candia Island).
2034 Plan de Foulepointe Côte Est de Madagascar.
2035 Mouillage de Joacema (Brésil).
2036 Baies de Kuakue et de Umne (Nouvelle Calédonie).
2037 Carte des Côtes de Caramanie et de Syrie, comprises entre Lissan el Kahpeh et Latakieh.
2038 New Hebrides. Iles Loyalty et Partie Sud des Nouvelles Hebrides.
2039 Carte Particulière de la Côte du Brésil. Sheet 5.
2040 Carte des Passages entre Cuba, la Jamaique et la Côte des Mosquitos.
2041 Mouillages dans le Golfe du Pe-tche-li et dans la Partie Nord de la Mer Jaune.
2042 Barre et Entrée de la Rivière de San Martin de la Arena (Côte Nord d'Espagne).
2043 Terre des Etats (Amérique Méridionale).
2044 Passages de Mamère (Nouvelle Caledonie Côte Est).
2045 Carte Particulière de la Côte du Brésil, Sheet 6.
2047 ——————————————————, Sheet 2.
2048 Golfes de Pe-tche-li et de Leao-Tong (Chine).
2052 Croquis de Havre de Bouritou (Côte Nord-est de Terre Neuve).
2053 Plan du groupe des Iles Condore ou Con-non.
2054 Carte Routière de la Côte du Brésil, partie comprise entre Rio Janeiro et Bahia.
2055 Plan du Havre des Grandes Ilettes (Terre Neuve).
2056 Penang, ou Ile de Prince de Galles (Détroit de Malacca).
2057 Carte du Canal compris entre la Côte de Caramanie et l'Ile de Chypre.
2059 Carte Routière de la Cote du Brésil, de Ceara à Bahia.

*Maps, Charts, &c.* *Donors.*

2061 Plan de la Baie de Tche-fou (Chine).
2062 Plan de la fond de la Baie St. Georges (Terre Neuve).
2063 Carte d'Atterrage de la Plata et de la Côte Sud du Brésil, de l'Ile Lobos à Tramandahy.
2064 Plan de l'Embouchure de la Seine (Environs du Hâvre).
2065 Plan du Port de Ceara (Brésil).
2066 Carte de la Presqu'ile de l'Indo-Chine, depuis le Port de Quinhon dans la Mer de Chine jusqu'à l'Entrée de la Rivière de Bangkok, Golfe de Siam.
2067 Basse Cochinchine et Cambodge. Carte générale.
2068 }
2069 }
2070 } Basse Cochinchine. Carte générale. On 4 sheets.
2071 }
2072 Basse Cochinchine, Atterrages du Cap St. Jacques, au Cap Ti-wan et à l'Embouchure du Ham-long.
2073 Basse Cochinchine, Atterrages du Cap St. Jacques à la Pointe Kega.
2074 Basse Cochinchine, 1ere feuille, Province de Bien-Hoa.
2075 ——————— 2eme feuille, Partie Nord des Provinces de Bien-hoa et de Gia-dinh.
2076 Basse Cochinchine, 3eme feuille, Provinces de Gia-dinh et de Dinh Touong.
2077 Basse Cochinchine, 4eme feuille, les Embouchures du Tien Giang.
2078 Basse Cochinchine, 5eme feuille, les Embouchures du Co Khien, Hau Giang, &c.
2079 Basse Cochinchine, 6eme feuille, le Tien Giang de la Frontière du Cambodge à Sadec.
2080 Royaume de Cambodge ou de Khmer, 1ere feuille.
2081 ———————————, 2me feuille.
2082 ———————————, 3eme feuille.
2083 Basse Cochinchine. Plan Particulier de la Baie de Ganh-Rai, du Phuoc Binh Giang jusqu'à l'Entrée du Rach-Mongom.
2085 Barre du Guarapari, Mouillages de Benevente, de l'Ile Française et d'Itapemirim (Brésil).
2086 Plan du Mouillage d'Itabapoana (Brésil).
2087 Plan du Mouillage d'Akureyré (Oë-fiord) Islande.
2088 Carte Particulière des Côtes de France. Embouchure de la Seine.
2089 Carte des Canaux d'Egripo de Talante et d'Oreos, et de l'Ile de Negropont.
2090 Plan de la Baie d'Ingornachoix (Terre Neuve).
2091 Carte Routière de la Côte du Brésil, de Rio Janeiro au Rio de la Plata et au Paraguay.
2092 Mouillages de Mamagua, Paratimiram et Cajahiba; Mouillages de la Baie Flamingo et de l'Ile Porcas (Bresil).
2093 Baie de Garopas, Itapacoroya, Ile San Francisco (Brésil).
2094 Plan du Port de Bahia (Brésil).
2095 Plan du Port de Saunder et des Havres de Keppel et de Hawke (Terre Neuve).
2096 Baie d'Ilha Grande et de Sapatiba (Brésil).
2097 Baie de Parangua, et Port de Santos (Brésil).
2098 Plan de Tamatave (Côte Est de Madagascar).
2099 Croquis de la Baie de Bahia de Todos os Santos (Brésil).

The Dépôt de la Marine.

Maps to Journal, Vol. xxxii., 25 Copies of each, viz.;—

Routes of Messrs. Michie and Grant. Flinders River. Route from Kurrachee to Guadur. Mr. Weller.

Tsu-sima Island. Stuart's Route across Australia. Malay Archipelago. (Wallace). Routes in Eastern Australia. Mr. Arrowsmith.

## INSTRUMENTS LENT TO TRAVELLERS.

To the late Mr. I. Duncan, Vice-Consul at Whydah, in 1849—

Telescope.
Two Compasses.
Aneroid Barometer.

Dr. P. C. Sutherland, M.D., F.R.G.S., at Natal—

Brass Sextant (7½-inch), with Silver Arc, by Troughton and Simms.
Strong-framed Artificial Horizon, by Troughton and Simms.
Two Barometers (Mountain), with Improved Iron Cistern, by Newman.

The late Dr. E. I. Irving, M.D., F.R.G.S., at Abeokuta—

Pocket Chronometer, by Barraud and Lund.
Barometer (Mountain), by Troughton and Simms.

Dr. D. Livingstone, M.D., F.R.G.S., Zambesi, Eastern Africa—

Sykes's Hypsometrical Apparatus, No. 1, with Sling Case, by Casella.
Standard Thermometers, 0 to 212, in Brass Cases, „
„ „ in Maroon Cases, „
Artificial Horizon, with Sling Case, „
Prismatic Azimuth Compass, silver ring, with leather Sling Case, „
Rain Gauge.

Dr. D. Walker, M.D., F.R.G.S., Russian America, Dec. 8, 1862—

Sextant, 4 in radius, by Cary
Artificial Horizon, Circular, by Cary.
Azimuth Compass, by Elliot.

The late Mons. Jules Girard, Upper Guinea, towards Timbuktu, Feb. 4, 1863—

Sextant, 3-inch radius, by T. Jones.
Aneroid, white metal, by Spencer, Browning, and Co.
Artificial Horizon, spirit-level, by Elliot.
Boiling-water Apparatus, and three Thermometers in brass tubes.
Azimuth Compass, by Bunner.
Two small Pocket Compasses.
Protractor, brass, 2-in. radius.
(The above in Leather Case.)
Measuring Tape, 50 feet.
Thermometer, on metal, in Morocco Case.
Protractor, horn, circular.

# PRESENTATION

OF THE

# ROYAL AWARDS.

THE Founder's Gold Medal to Captain T. G. MONTGOMERIE, for his great trigonometrical survey from the plains of the Panjab to the Karakoram Range, embracing an area of 56,000 square miles, during which observations were taken at upwards of 20,000 feet above the sea, and the height fixed of the second highest known mountain in the world. The Patron's or Victoria Gold Medal to Mr. SAMUEL W. BAKER, for his vigorous explorations, entirely at his own cost, in the interior of Africa, whereby he first determined the course and position of various affluents of the Atbara; next, for having fitted out at Khartum an expedition, by which he relieved Speke and Grant; and thirdly, for his noble endeavour to complete the discoveries of those travellers by the further exploration of Equatorial Africa, in which he is still engaged.

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The awards having been read, the PRESIDENT thus addressed the recipients of the Medals :—

"CAPTAIN MONTGOMERIE,

"As I have for many years felt deeply interested in every effort to develope the physical geography of the Himalaya Mountains, so was I highly gratified, when, at the recommendation of your former able leader Sir Andrew Waugh, the Council awarded to you our Founder's Medal.

"When we reflected upon the remarkable facts, that you had passed from the hot plains of Hindostan to the loftiest region on the face of the globe, and that there, amidst enormous glaciers, you had made accurate scientific observations at stations one of which was five thousand feet higher than the summit of Mont Blanc, we could not fail to applaud and reward such noble feats, displaying as they did the great abilities and energy with which you conducted so arduous a survey.

"Accept, then, this Medal as a testimony of the admiration with which the Royal Geographical Society contemplates such deeds, and be assured that in our body no one more truly rejoices than myself in seeing you thus rewarded."

Captain Montgomerie replied:

"Mr. President and Gentlemen,—I came here totally unprepared to return thanks on this great occasion, but I find it is required by the forms of the Society that I should do so. Therefore, I beg to return my sincere thanks for the great honour that has been done through me to the particular portion of the Trigonometrical Survey of which I had the honour of having the charge. At the same time I beg you will understand that I accept this Medal as a reward for the services of those who have worked with me, and who have undergone all the hardships. I would more especially name Captain Godwin-Austen, Captain Melville, Messrs. Johnson and Beverly, and many others whose names are printed in the Reports of the Trigonometrical Survey. They have one and all assisted me; they have gone with me through all the various difficult tasks that we have had to perform: they have ascended glaciers, encamped on peaks, and gone through every hardship that they could possibly be expected to encounter, with great zeal and cheerfulness. It is exceedingly gratifying, I hope, to them that their services should have been in some way recognized by my receiving a Medal from this learned Society, especially chartered to decide upon Geographical subjects. The Survey has been carried on from year to year. It was at first designed by Sir Andrew Waugh: the party was organised and it has been superintended and directed by him during the most arduous years in which it was in progress: and without his constant support and kindness we should never have been able to carry the work as we have done up to the borders of Kurdistan."

Next, addressing Mr. John Baker, the brother of the recipient of the Victoria or Patron's Medal, the President thus spoke:—

"Mr. John Baker,

"You have great reason to be proud of being the brother of a man, who by his self-sacrificing devotion to the cause of Exploration of unknown countries, has justly obtained the Patron's Medal of the Royal Geographical Society.

"The author of 'The Rifle and the Hound' long ago gave earnest that the same adventurous spirit which led him in pursuit of wild animals into the fastnesses of India, would afterwards lead him to undertake grander excursions in the character of a true scientific explorer.

"To say nothing of the discoveries of Samuel Baker on the banks of the affluents of the Atbara, a grand tributary of the Nile: I never was more penetrated with a feeling of admiration than when I heard of his spontaneous exertions to fit out an expedition at Khartum, to meet and relieve Speke and Grant, in the belief that our envoy, Mr. Petherick, had encountered disasters which must prevent him from reaching those travellers. Still more did my estimate of the high qualities of your brother rise, when I heard that after relieving his friends he had advanced, despite of all obstacles, into the heart

of Equatorial Africa, there to work out the details of the great problem which Speke and Grant had in great measure solved.

"Anxiously hoping that your brother may ere long return to England laden with fresh trophies, to the prospect of which I shall allude in the course of my coming Address, I beg to present to you in the mean time this our Victoria Medal as a token of our high appreciation of the devoted and chivalrous services of Samuel Baker."

Mr. BAKER then replied :—

"Sir Roderick Murchison,—I beg to thank you for the very flattering manner in which you have alluded to my brother. It gives me great pleasure to attend here to-day on his behalf, and receive this Medal which you have so kindly awarded to him. The only drawback to my pleasure on this occasion is that my brother is not here to thank you in person for the honour you have conferred upon him. I cannot help feeling anxious at his long-continued absence, and can only earnestly hope for his safe and speedy return; and whilst thanking you very much for the honour you have done him in presenting him with so distinguished a mark of your approbation, I look forward to the great pleasure it will afford him when I can present it to him in person."

After the presentation of the Royal Medals, the PRESIDENT delivered a Testimonial, value 40*l*., to Dr. ARMINIUS VÁMBÉRY, addressing him in these words :—

"M. VÁMBÉRY,

"On the part of the Council, and in the name of the Royal Geographical Society, I hand to you this honorific donation, as a token of our regard and of the high estimation in which we hold your adventurous journey into Central Asia. Admiring the self-reliance, courage, and perseverance which enabled you to penetrate from Khiva through the deserts of the Oxus, and to obtain the notice of the Khan of Bokhara amidst the palaces of Samarkand, we well know that you never could have made the journey had you not qualified yourself, by long preparation and study, to travel in the character and guise of a holy Dervish.

"But our wonder at your successful journey, when first related to us, was modified when we found that you possessed such a marked power of fascinating all those with whom you are brought into contact; and we now understand how the Dervish had his own passport in his hands.

"Earnestly hoping that your attractive and interesting volume will be largely bought by the public, all Philologists should be proud of the spirit which led you, as a Hungarian, to overcome such appalling difficulties in your desire to trace out the root of your own dear Magyar tongue among the natives of the East. Pray receive this purse as the price of so many copies of your excellent work."

Dr. VÁMBÉRY replied as follows:—

"Mr. President and Gentlemen,—When last year I had the honour of addressing this Society, I could not do it as I wished, because I was then but a half-civilised man. Coming back from Tartary, and having become myself half a Tartar and Dervish for many years, on arriving in the wonderful metropolis of the still more wonderful English nation, I found I had but little knowledge of the language, and was unable to express myself. But now, after having passed one year in England, I can say that I am a little more civilised, not totally, but sufficiently civilised to express my deepest thanks to this Society for the honour and the kindness it has bestowed upon me. Before all, I must acknowledge the kindness with which I was recommended by the Society in England. The reception and hospitality I have met with here, which I shall never forget, and which never could be forgotten by any foreigner in England, is entirely owing to the recommendation of the Royal Geographical Society."

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NOTE.—Mr. Petherick, lately H.M.'s Vice-Consul at Khartum, who had just returned to England, having expressed his opinion at the last Anniversary Meeting, that the terms of the award of the Patron's Medal to Mr. Samuel Baker might seem to throw discredit on him for not having performed his engagement, by succouring Speke and Grant, it is my duty to repeat what I said at the meeting, that on this point Mr. Petherick had quite misconstrued the meaning of the words used by the Council.

In their award of a medal to Mr. S. Baker, they dwelt solely on his motives and deeds at a time when he knew that Mr. Petherick had met with heavy disasters in the region to the west of the White Nile, which must, he thought, prevent Mr. Petherick from going southwards to the relief of the travellers.

This, in truth, was my own conviction when I penned my Address of 1863. Mr. Petherick has now transmitted a letter to the President and Council, calling for some recognition of his services, and that subject is under the consideration of the Council.

RODERICK I. MURCHISON.

*June 13th*, 1865.

# ADDRESS

TO THE

# ROYAL GEOGRAPHICAL SOCIETY.

*Delivered at the Anniversary Meeting on the 22nd May, 1865,*

BY SIR RODERICK IMPEY MURCHISON, K.C.B.,

PRESIDENT.

GENTLEMEN,

In addressing a Society with whose progress I have been bound up since its foundation, I am naturally much gratified by being able to state that, having now through your kindness occupied the chair at eleven Anniversary Meetings, on no one of those occasions has it fallen to my lot to announce the existence of so large a number of Fellows as at present.

I have also the sincerest pleasure in congratulating you on the very successful labours of our new officers; for I trust you are all as highly satisfied as the Council and myself with the zealous and most effective services of our Secretaries, Mr. Clements Markham and Mr. Laurence Oliphant, and of our Assistant-Secretary, Mr. H. W. Bates.

I have, further, great satisfaction in calling your attention to the almost unprecedented fact in the annals of our Society, that the volume of the Journal for the past year, thanks to the untiring efforts of the Editor, is already on your table. A catalogue of our library is also completed, while the classified catalogue is making rapid progress.

In this Address I commence, as of old, with short sketches of the lives of our deceased Fellows. In the next place, after the Report of the Hydrographer on Admiralty Surveys, my chief object will be to lay before you the condition of geographical science and discovery when our Society was established, and to show

how greatly our countrymen, and our Associates in particular, have augmented the range of geographical knowledge in the thirty-five years which have elapsed since our labours began. On the present occasion, however, I cannot attempt to condense into one Address a review of such progress in all parts of the globe; but will mainly dwell on the knowledge of certain regions obtained in our time, concluding with glimpses into the vast untrodden fields which no scientific traveller has yet explored.

## OBITUARY.

Eight months have elapsed since the melancholy catastrophe occurred, in which the celebrated explorer of Inner Africa, John Hanning Speke, lost his life. On the very day of his death he had attended the Geographical Section of the British Association at Bath, over which I presided, and the grief and horror of my associates and myself can well be imagined when the overwhelming news was communicated to us.

Having encouraged Captain Speke to return to Africa to work out the results of his great discovery of the vast body of water which he named "Victoria Nyanza," I rejoiced to witness the enthusiasm with which he was received by admiring crowds on his return to us after following certain waters of the Nile from that great reservoir of Equatorial Africa to the mouth of the mighty stream. It was also, alas! my sad duty, in company with his faithful companion Grant and Dr. Livingstone, to follow poor Speke's remains to the burying-place of his family, at the romantic and sequestered village of Dowlish, in Somerset. Yet, let me assure you that in those rural obsequies there was that which touched my heart as much as if my gallant friend had won a place in Westminster Abbey; for crowds of the surrounding gentry and inhabitants were there to mourn his loss and sympathize with his bereaved parents; whilst his affectionate friend and companion, Grant, placed an *immortelle* upon his coffin.

Descended from a very ancient family which from Saxon times has had possessions in the West of England, and some of whose representatives were Knights Bannerets under our early Kings, John Hanning Speke, the second son of William and Georgina Elizabeth Speke, was born on the 4th May, 1827, at Orleigh Court, near Bideford. He was educated at Barnstaple Grammar School, went to India as a cadet at the age of 17, and in 1844 obtained a commission in the 46th Regiment of Bengal Native

Infantry. In the war of the Punjaub he took part in the actions of Ranuggur, Sadootapore, Chillianwallah, and Guzerat. After that arduous campaign he began to turn his thoughts to the exploration of Central Africa. In the mean time, however, he employed the intervals of leave of absence from his regiment in qualifying himself for geographical research by exploring the Himalayas and Thibet; where, besides the pursuits of natural history and obtaining many spoils of the chase by the use of his unerring rifle, he taught himself how to make astronomical observations and how to construct field sketch-maps. In illustration of his pursuits and occupation during this period of his Indian service, his devoted companion, Grant, has furnished me with the following graphic sketch which evidently comes from the heart of that gallant soldier.—"No man in India was ever more esteemed for his private worth than poor Speke—and with just reason, for no one was more courageous, no one more honourable. His brother officers and friends were his staunch admirers, and the natives over whom he was placed in command attached themselves to him, and clung round him from their instinctive knowledge of his quiet and conciliating manners.

"His chief passion was to make a collection of the fauna of India, and in this, through his perseverance, the museums of India and England, particularly that which was formed by his father at Jordans, near Ilminster, bear noble testimony of his exertions for the advancement of science. Blessed with enduring powers, whether following the wild boar on his fleet 'Queen Mab' over the plains of India, or on foot, crossing the glaciers of the Himalayas, after the 'Yak of Thibet,' he it was who excelled and was the first sportsman of each season in those manly exercises. During his Himalayan wanderings he did not go there as a mere slayer, but preserved with care those birds and animals which fell to his gun or rifle. He also registered the topographical features of the country by delineating on charts the distances traversed, the courses of the streams, and the form of the mountains, as a guide to future explorers and sportsmen. Thus, in early life he showed a decided taste for true observation and cartography. One, at least, of his early maps is in my possession, and he gave others to those who were most likely to use them well. As he took his observations in India merely with a watch and compass, the sketch-routes were of course rough; but as most of the countries had not been traversed before, his maps were acknowledged, by those who afterwards tested them, to contain most valuable information."

Having completed a collection of a large portion of the fauna both of the plains and hills of Upper India and Thibet (one of the finest collections ever made by any individual) he turned his thoughts to a less frequented tract—namely, Eastern Africa. His first enterprise in this direction was in 1854, when he joined the expedition organized by Captain Burton, associated with Lieutenants Herne and Stroyan, to penetrate the almost unknown and perilous country of the Somali. Whilst his principal journeyed to Harar the capital, Speke was detached to Guray Bunder, with directions to explore the Wadi Nogal, and to visit the Dulbahantas, the most warlike of the Somali. On their return to Berbera, the party were attacked in camp, in the dead of the night, by a band of 150 men; Lieut. Stroyan was killed, and Speke escaped almost by a miracle with eleven spear-wounds in his body. One of the weapons passed through the fleshy part of his leg, and kept him for some time pinned to the ground.

Notwithstanding this, we find him, not long afterwards, and whilst his wounds were still green, at Constantinople, on his way to join the Turkish contingent in the Crimean war. The only passion, in fact, which was more strongly developed in him than the love of exploration, was that of fighting for his country. Disappointed of this by the conclusion of peace, before the services of the Contingent were employed, he conceived the idea of exploring Circassia and Central Asia, but finally gave up this to join Captain Burton in a new expedition into the heart of Africa.

From the commencement of this great exploration, in which such a large portion of Inner Africa was first made known to us, including the lakes Tanganyika and Victoria Nyanza, down to the day when we heard of his advance from the Equatorial kingdoms and his own vast water-basin to the mouth of the Nile, the career of Speke is so impressed on the minds of all who hear me that I need here only to mention those feats to ensure your hearty approbation of them. For, whilst we rightly gave him our Gold Medal for the discovery of the Victoria Nyanza, on his first journey with Burton, we were still more hearty in our applause when he issued triumphantly, on his second journey, with his devoted companion, Grant, by the mouth of the Nile. I will not here enter upon the vexed question of the source of the Nile, as that will be touched upon in the course of the Address when I speak of the desiderata respecting Inner Africa which remain to be worked out.

It is to commemorate the above-mentioned noble deeds of Speke

that I called upon his admirers to unite in rearing a monument to his memory, and I am happy to say that a small sum only is now required to complete our object. I therefore trust that, just as his countrymen of the West of England presented to him pieces of plate to be heirlooms in his family, so Geographers will ere long cause to be erected in this metropolis a monument which shall be an enduring testimonial of our high estimate of a daring enterprise of which every Englishman may be proud.

The DUKE OF NORTHUMBERLAND.—Well might the muffled bells throughout the county of Northumberland, on Sunday, the 12th of February, excite the deepest sorrow, for their tolling announced the sad tidings that Algernon, the good Duke of Northumberland, had breathed his last that morning. Residing in his princely Castle of Alnwick, that fine old feudal seat of the Percys, which with correct taste and at great expense he had just restored to its ancient style and enlarged, he succumbed to the severity of an attack of gout, from which malady he had suffered for some years.

Born in 1792, Lord Algernon Percy was early intended for the Royal Navy, which service—after a noviciate at Eton—he entered in 1805. He served successively in the *Tribune* frigate, the *Fame*, 74, and the *Hydra*, 38, from which last ship Captain Mundy appointed him to the command of a gunboat, to co-operate with the patriots on the south coast of Spain. His Lordship afterwards joined the *Christian VII.*, bearing the flag of Sir Edward Pellew (afterwards Lord Exmouth), off the Scheldt. Returning to the Mediterranean with that celebrated commander, he served as Acting-Captain of the *Caledonia*, of 110 guns, in a partial action with the French fleet off Toulon in 1813; and he was present at the fall of Genoa in the following year. He subsequently commanded the *Cossack*, 22, on the coast of North America, when his promotion to post-rank, and a general peace, induced him to go upon half-pay: nor had he since served afloat, though he ever evinced a warm predilection for the profession, and by seniority became a Rear-Admiral on the Reserved List in 1850, Vice-Admiral in 1857, and Admiral in 1862.

On resuming shore-life his Lordship was created Baron Prudhoe in 1816, and his enquiring mind next led him to enter with ardour into the scientific pursuits of the day. In 1818 he was elected a Fellow of the Royal Society, and the attractions of Geography and Archæology prevailing with him, he joined Sir Gardiner Wilkinson in making extensive researches over Egypt and Syria,

where his investigations—especially in Biblical chronology—are stamped with ability and judgment; while the British Museum, to which he made rich contributions, and his own museum at Alnwick Castle, testify to his taste and diligence as a collector of sculptures, coins, and other antiquities.

Meantime Lord Prudhoe was enrolled in the Society of Antiquaries and other learned bodies, and was a member of this Society from its commencement. Afterwards he became President of the Royal Institution of Great Britain, and of the Royal United Service Institution; and, lastly, he was elected a Trustee of the British Museum. His kindly disposition also induced him to take a leading part in numerous benevolent foundations; and he was ever ready to contribute with discriminating philanthropy—both in person and in purse—towards the physical and moral improvement of his poorer countrymen.

In 1842, Lord Prudhoe married Lady Eleanor Grosvenor, eldest daughter of the Marquis of Westminster; and in 1847 he succeeded his brother, the third Duke, in the Percy honours and estates. On that occasion his first order was truly characteristic of the man—"Continue," said he, "all the pensions and other charities granted by my late brother." He then commenced those improvements of his estates which have rendered those extensive domains so remarkable for the well being of his numerous tenants. With a graceful devotion to the duties of his position as well as the enjoyment of its rights, he not only provided comfortable dwellings for those who were connected with him, but also established schools and erected several new churches—three of the latter having been consecrated in August last. Besides the endless charities to which he subscribed, he supported, from professional feelings, the Seaman's Hospital Society, and built a capacious "Sailors' Home" at North Shields. But among his philanthropic deeds, on which he expended altogether half a million of money, none were more eminently beneficial than the establishment of life-boats, at selected stations along the stormy shores of the east coast of England: thus numerous sufferers were rescued from death, and a generous intrepidity instilled into the seamen employed.

A Conservative on principle, the Duke joined Lord Derby's ministry in March 1852, as First Lord of the Admiralty; becoming also a Privy Councillor, and a Knight of the Garter. He remained in the Cabinet until the dissolution of the administration in the following December. While at the head of that important department, he

supported measures for the aid and recovery of Franklin and the missing Arctic voyagers; and he offered to facilitate Mr. Lassell's astronomical expedition to the Mediterranean. On learning from Admiral Smyth that the officers of the institution in Jermyn-street, now under my direction, were endeavouring to purchase ancient medals for the purpose of chemical analysis, the Duke directed an accumulation of 1575 abraded coins to be sent thither, saying—"I am desirous to assist the Museum of Practical Geology, and its excellent Director, Sir Henry De la Beche."

Indeed, his Grace was ever a munificent patron of science and literature, as evinced by the various books and local surveys brought out under his auspices. One of his first acts was to confirm his brother's intention of defraying the expenses of Sir John Herschel's important volume on the astronomy of the Southern Hemisphere. He also most liberally supported Mr. Lane in the publication of his illustrated 'Arabian Nights,' and in preparing the volumes of the great Arabic Lexicon of that eminent scholar. He caused a survey to be carried on by Mr. Maclauchlan, to trace the Roman Wall through its wide span, and the windings of the Watling Street across the county—the results of which are contained in a folio of large plates most carefully engraven: a prehistoric map of Northumberland was also in hand at the time of his demise. Another proof of the Duke's capacity for selecting qualified authors and artists is displayed in a book giving the architectural and pictorial details of Alnwick, Prudhoe, and Warkworth Castles; and he, moreover, encouraged the production of various essays on local subjects which were published by the Archæological Institute of Newcastle. He also printed a description of Roman family *denarii* in his possession, for distribution among his numismatic acquaintances; and even the effusions of a Northumbrian shepherd poet were collected and illustrated at the Duke's desire.

Nor ought this sketch of the life of our excellent member to close without mentioning that, in addition to his other sterling qualities, the Duke, ever attentive to the care and keeping of his gardens and pleasure-grounds, was most successful in the culture of rare exotics. Thus the gorgeous *Victoria Regia*, discovered by our deceased Fellow, Sir Robert Schomburgk, fell under his care; and it was in the spacious tank provided for its reception at Sion House, with water in motion, that this superb tropical lily first flowered in England. He also brought that most delicate tree, the *Garcinia Mangostina*, the most exquisite of Oriental fruits, to perfec-

tion; and its first and only mature fruit ever produced in Europe was presented by the late Duke to Her Majesty the Queen.

To this truthful and characteristic sketch of the highly honourable career of the Duke of Northumberland, from the pen of his old brother officer, my predecessor, Admiral Smyth, and which I gladly endorse in every particular, let me offer the expression of my own deep sorrow for the loss of one whose friendship I had long enjoyed, and for whom my regard and respect were heightened in each succeeding year by a contemplation of his enlightened and benevolent actions. Sincerely, indeed, do I grieve for the bereavement of that noble lady who was the charm of his life, and the active and zealous participator in all the good works of Algernon Percy Duke of Northumberland.

Dr. Hugh Falconer.—The Natural History Sciences have sustained a heavy loss in the death of my gifted friend, Dr. Hugh Falconer. Born at Forres, N.B., in 1808, and receiving his early instruction in that town, his education was completed in the Universities of Aberdeen and Edinburgh.

On his way to the East Indies, and whilst in London, the taste of the young medical man for Natural History subjects was developed by his examination of the contents of public museums. It was, however, after he reached India, and was associated with the celebrated botanist Dr. Royle at Suharunpore, near the Himalaya Mountains and the lower range of the Sewalik Hills, that he began (in 1832) those explorations in which, associated with Captain, now Sir, Proby Cautley, he collected and described those remarkable fossil remains, the discovery of which formed an epoch in geological history. It will be more especially the province of the Presidents of the Royal, Geological, Linnæan, and Zoological Societies, to dwell upon the great accessions contributed to various sciences by Dr. Falconer. On my part it is an agreeable duty to impress upon you that, amidst all his other qualifications, our deceased Associate was a sound and zealous Geographer. In one of his earliest expeditions in the mountains of Hindustan we are told that, when in want of proper instruments to measure altitudes, he melted broken tumblers and blew them into a tube, distilled mercury from cinnabar bought in the bazaar, and completed his barometer by turning a reservoir out of boxwood from the adjacent hills.*

* See an excellent sketch of the life of Dr. Falconer from the pen of Dr. C Murchison.—'Reader' Journal, February 11, 1865.

During several years of arduous research he not only explored the wonderful fossil mammalian remains which now form one of the principal glories of the British Museum, but, when remote from all works of reference, he compared the extinct species with their living analogues in that region, and, together with his associate Cautley, brought out those remarkable memoirs and illustrations which procured for each of the authors the Wollaston Medal of the Geological Society.

Whilst Superintendent of the Botanic Garden at Suharunpore, Dr. Falconer made various explorations of the higher tracts of the Himalaya chain, and was among the first to recommend that the tea-plant should be introduced into suitable parts of these mountains. In the following years—1837 and 1838—he explored, by order of the Government, the trans-Indus portion of the Himalaya, and spent a winter and spring in Cashmeer. From thence he crossed the mountains to Iskardo in Baltistan, traced the course of the Shigar, a great tributary of the Indus, to the glacier whence it springs, on the southern flank of the lofty Mustagh range, and after next examining the great glaciers of Arundu and Braldoh, returned to resume his duties in the plain. It was during this remarkable and hazardous journey that he studied closely the phenomena of glaciers and the flow of their moraines, as well as of rivers in deep valleys formed by great antecedent geological movements, which enabled him to speak to us with so much effect within these walls on the whole subject of glacial phenomena, and to oppose with force and eloquence the new theory of the excavation of valleys and lake basins by the grinding power of ice. Those of you who heard him on that occasion can never forget the impression which his clear language and vigorous delivery produced, and I believe you will all agree with me, that the occasion afforded a pregnant proof of the desirableness of reporting the sayings of those who can speak as he did at our meetings. This one speech, indeed, of Falconer, as happily recorded in our Proceedings, embodied such a true philosophical view of the real agency of glaciers as dependent on geographical and atmospherical conditions, that it will often be appealed to as an authority, and I naturally made great use of it in my last Anniversary Address when treating of Glaciers. Compelled to come to Europe in 1843, on account of failing health, he occupied his time at home in the publication of various memoirs descriptive of his collection, and in 1848 he returned to India as successor to Dr. Wallich, the Superintendent of the Botanic

Garden at Calcutta; and in that office, among several Reports of great value, he was urgent in recommending the trial of the introduction of the Cinchona or Peruvian-bark plant into the Nilgherries and the hilly regions of Bengal, to which districts these plants have of late years been transported from their native habitats in Peru, by our Secretary, Mr. Clements R. Markham. Retiring from the Indian Service in 1855, he visited Syria, Constantinople, and the Crimea, during the siege of Sebastopol. During the last years of his life it was quite natural that he should have taken an active part in every geological and palæontological research which might tend to throw light on the antiquity of man; for as early as 1833 he began to speculate on the possibility of human beings having been in existence when some of the gigantic extinct quadrupeds, whose remains he had discovered, were still living. The President of the Geological Society has dwelt with emphasis on his various reports on the age of those cavern deposits of Britain and elsewhere, in which implements fabricated by man have been found associated with the remains of extinct animals. In the same pursuits Falconer spent some portion of the last autumn with his friend Professor Busk in exploring the bone-caves of Gibraltar.

Although it might be thought that this subject does not come within the cognizance of the Geographer, yet I beg to assure my hearers that the geographical question of the configuration of land and waters past and present has much to do with the discussion of the great antiquity of our race, the accurate investigation of this subject being certain to throw light on the outlines of land and water which must have existed at the time when the primæval inhabitants manufactured their rude stone implements. For, these relics are frequently found in very old alluvia high above the rivers and bottoms of the present valleys; thus indicating either an enormously long lapse of time, during which the rivers have excavated down to the existing level, or, as I believe, the occurrence in times antecedent to historical records of sudden upheavals of the land, probably coincident with those great disturbances by which the British islands were separated from the Continent, and Ireland from Great Britain.

Whilst Dr. Falconer was foremost in the discussions which took place on every question pertaining to this exciting topic, and was ever zealous in exploring caves whether at home or abroad, and in distinguishing the species of extinct animals of different periods, he was equally alive to any question connected with the science of pure Geography. Thus, one of his very last letters was addressed to

myself, recommending the Council of this Society to contribute a sum for completing the determination of the real depression of the Dead Sea, all the various conflicting estimates of which were so accurately pointed out by him as to ensure our adoption of the project. In this work we had, through his counsel, the good fortune to lead the way, and the Government Grant Committee of the Royal Society followed us in furnishing the means for completing this most desirable survey.

After this brief notice of his labours in various branches of science, I regret to state that Dr. Falconer has given to the world a small portion only of that wonderful amount of knowledge which was stored in his capacious mind. Ever cautious, like the Prince of Botanists Robert Brown,* whose memory he specially cherished, in publishing any opinion until he was perfectly sure of its accuracy, Falconer has left behind him numerous diaries, notes, and papers, which in the hands of judicious commentators may, it is hoped, be made good use of in further illustration of his character. In the mean time I can truly say of him, that in my life I never met with any man who possessed keener powers of observation, and greater love of truth, or who was a more determined, straightforward, and honest supporter of it; whilst those who knew him will affirm with me, that by the death of Hugh Falconer we have been bereft of the most genial of companions and the heartiest of friends.

In recollecting that I am sixteen years his senior—for I was on service with Sir Arthur Wellesley when Falconer was born—how profoundly do I lament that he was not spared to us for a few more years to enable him to mature and complete to his own satisfaction many a work of true importance to mankind.

The Duke of Newcastle.—By the decease of the Duke of Newcastle the Society has lost a kind friend, and the country a meritorious and high-minded statesman. It is not my province to endeavour to sketch the political career of this excellent man; but it is my pleasing duty to state, that as long as he held the post of Colonial Secretary he lost no opportunity of promoting geographical science. Nay more, I must recall to your recollection that when we awarded our Gold Medal to the family of the lamented Burke, his Grace attended our anniversary meeting, and on receiving the medal for the bold explorer of Northern Australia, spoke to us with

* See my sketch of the character of Robert Brown, Anniversary Address, 1859, Journal, vol. xxix. p. cxv.

a feeling for the noble fellow who perished and a knowledge of the subject, which proved how sincerely he cherished the objects of this Institution, and how much he appreciated our recognition of that adventurous colonist.

Few men of this century have laboured more for the public weal than the Duke of Newcastle, and it may truly be said of him that he shortened his life by severe and incessant assiduity in scrupulously carrying out his official duties.

Accessible to every applicant, he most conscientiously strove to serve efficiently his sovereign and the country; and I have no doubt that our gracious Queen, duly appreciating his services as the Mentor and friend of the Prince of Wales in America, never rewarded any one of her subjects with more satisfaction than when she bestowed the Order of the Garter on the late Duke of Newcastle.

Professor F. G. W. Struve.—One of the greatest astronomers of our age, whose name graced our list of Honorary Corresponding Fellows, has been taken from us since our last anniversary, in the 72nd year of his age. M. F. G. W. Struve was one of those men who, through the vigour of their minds, never cease to carry out any important object until complete success has been obtained. Enjoying the full confidence of the Emperor Nicholas, and well supported by that munificent Sovereign, he brought the Imperial Observatory of Pulkova to the highest degree of perfection. The chronometrical expeditions which under his direction were sent forth to determine with the utmost precision the longitude of the Russian Observatories, brought M. Struve, his son Otto Struve, and their associates, to our shores, in 1843; and comparisons were carried on by the Russian astronomers, and by numerous instruments, between Pulkova, Altona, and Greenwich,—the result being that the old meridian of Pulkova was found to be in error nearly half a verst in linear dimensions.

But the operation by which Struve was most intimately connected with Geographers was the measurement of the great arc of the meridian, in which, associated with General Tenner, the eminent topographer, he eventually completed the measurement from the North Cape to the Black Sea, or over 25° 50″ of latitude. This, as I said in my Address of 1845 (but before the work was completed), greatly exceeds all other known triangulations, and gives to the vast mass of land possessed by Russia and Sweden the longest measurement which can ever be made on *terra firma*.

In his open and frank manners, M. Struve had much of what we

rejoice in considering the English character, and was as much liked by all our countrymen who knew him as he was esteemed and beloved in Russia, the country of his adoption.

He was present, as well as myself, at the installation of H.R.H. Prince Albert as Chancellor of the University of Cambridge, on which occasion he received the honorary degree of LL.D.

Another of our deceased Honorary Corresponding Members, and one who has long been distinguished as a Geographer, is the Russian Baron George de Meyendorf. Belonging to a Livonian family of distinguished men—his brother, the late Pierre de Meyendorf, was an eminent and much-beloved diplomatist and statesman under the Emperor Nicholas, and another brother, Alexander, also deceased, was my companion in my first geological tour in Russia (1840)—Baron George, the deceased Geographer, rendered his name conspicuous by his travels in Asia, and particularly by his journey to Bukhara, accompanied by Eversmann and Pander, both *savans* of note. The work descriptive of this expedition of 1820 appeared in 1826 under the title of 'Voyage d'Orenbourg à Boukhara, redigé par le Baron George de Meyendorf et revu par A. Jaubert.'

The Honourable Edward Everett.—By the death of our associate, Mr. Everett, who was eminently distinguished by his various literary acquirements, and was for some years Minister of the United States in this country, I have lost one of my most esteemed friends. A native of the State of Massachusetts, and born in 1794, this excellent and accomplished man was educated at Harvard College, and in early life became a pastor of a church in Boston. Subsequently, having been appointed to the Professorship of Greek in his own University, he came to Europe the better to qualify himself for his new duties, and when in England was well known to Walter Scott, Macintosh, Romilly, and other celebrities, and on his return home became editor of the 'North-American Review.' Subsequently, Mr. Everett took a leading position in his country as a speaker of public addresses, by which he became renowned—the last of these having been delivered on the hard-won battlefield of Gettysburg, when the army of his Northern countrymen had for the first time defeated the skilful Confederate General Lee, when he invaded the State of Pennsylvania. As a member of Congress, during 10 years, he continuously occupied himself with the transaction of foreign affairs, and composed some of the best state papers of his Government, including a series of letters to Mr. Canning on colonial trade.

Three times elected Governor of Massachusetts, he organized a

Board of Education, and to his great credit established normal schools, scientific and agricultural surveys of his native state, and a commission for the revision of criminal law. Revisiting Europe in 1840, with his wife and children, he first spent some time on the Continent, and was, through the influence of his friend, the celebrated Daniel Webster, appointed Minister at our Court. Although at that time a number of irritating questions agitated both countries, and he was left to act according to his discretion, so sagacious was his conduct, and so soothing his demeanour, that he entirely satisfied both the American and British Governments. It was during his residence here that I had frequent intercourse with Mr. Everett, and every year my esteem and friendship for him increased. In 1845 he returned home, became President of his old college at Harvard, and published a collected edition of his addresses. For a time he was in office as Secretary of State, and although he was elected a senator of his native state, his health had become so much weakened that he re-appeared little in public until he delivered the remarkable address on the field of battle at Gettysburg to which I have already alluded. Nothing can more strongly demonstrate the strong feeling of patriotism which animated Mr. Everett than that he, a peace-loving man, should have quitted his retirement to make that eloquent harangue in honour of those who had fallen in the endeavour to preserve intact the great American Republic in whose Union he gloried.

Sir Robert Hermann Schomburgk.—This extensive traveller was first brought into the notice of Geographers by his exploration of the little island of Anegada, the north-easternmost member of the Virgin Islands, his account of which was published in the second volume of our 'Transactions.'* When this memoir was read before our Society, I well recollect the very favourable impression made upon my associates and myself by the energy, zeal, and ability displayed by the then unaided young Prussian traveller in delineating on a map all the rocks and reefs around this island so dangerous to navigators, and by which he doubtless saved the lives of many seamen. In subsequent years M. Schomburgk explored the rivers Essequibo, Corentyn, and Berbice, and investigated in detail the capabilities of the rich and fertile colony of British Guiana. During these researches he discovered and sent home the magnificent lily *Victoria regia*, now so well established in Europe. By his journey

* Vol. ii. p. 152.

across the interior from the Essequibo to Esmeralda on the Orinoco he was enabled to connect his observations with those of his illustrious countryman, Humboldt, who had always been his patron, and thus to determine astronomically a series of fixed points extending across the watershed of the great rivers of Equatorial America. For these remarkable services, by which the sciences of zoology and botany, as well as geography, were greatly enriched, this Society rightly conferred on M. Schomburgk, in the year 1840, one of its Gold Medals. At the same time he was appointed Consul in British Guiana. Returning to that region, he extended his travels, in 1843, from Pirarara overland to the head-waters of the Corentyn, and descended that river to Demerara, as recorded in the fifteenth volume of our 'Transactions.' He then received the order of knighthood. In 1848 Sir Robert published an excellent work on Barbadoes, graphically describing the hurricanes of the region as well as the statistical and political condition of the island. In the latter years of his life he was, to the great benefit of our interests in the East, employed as Consul-General in the kingdom of Siam, where, by his conciliatory manners and sound judgment, he has greatly advanced the interests of our commerce, and sustained the best relations with a singular and heretofore little-known people.

Nor has he whilst there been less alive than in earlier years to the importance of geographical surveys; for, besides other excursions, including an important journey from Bangkok to Chiengmai, the principal city of the Lao country, he repaired to the isthmus of Kra, with a view of ascertaining by actual observation the value of the recommendation to cut a ship-canal across it, and thus save the long detour by the straits of Malacca, for the trade between Siam and British India. Feeling that his health was declining, Sir Robert Schomburgk returned to this country last autumn, and on retiring from public life obtained a well-merited pension, which unhappily he enjoyed but a few months, for he died at Berlin on the 11th March.

Dr. BAIKIE.—In the Address of last year I alluded to the prospect of the return of this deserving African explorer and Envoy of our Government, but alas! he was taken from us on his homeward voyage.

Twelve years ago Dr. Baikie, then an assistant-surgeon of the Navy under Sir John Richardson, was recommended to me by that eminent man as a person capable of taking part in an expedition which was then fitting out to ascend the Niger in

a steamer, the *Pleiad*, built for the purpose, with the view of forming a sort of trading settlement amongst the natives of the interior of Africa. On the death of Consul Beecroft, who had been appointed leader, the command of the expedition devolved upon Dr. Baikie, who carried the enterprise to a successful issue, and on his return published an instructive account of the voyage.

In his subsequent voyage, in 1857, the unfortunate loss of the iron steamer, *Day Spring*, on the rapids at Rabba, which would have disheartened most men, only served as a stimulus to Baikie and his associates to elicit the best results in their power even in this forlorn state. Gathering together the débris of the vessel and erecting huts on the neighbouring banks, they were soon in a condition to open communications with surrounding native chiefs, which eventually led to an interview with the principal sovereign of those parts, the Sultan of Sakatù. Another vessel, the *Sunbeam*, was sent out to the shipwrecked party, and a settlement was established at Lukoja, near the junction of the Chadda and the main stream. After seven years of persevering endeavours in promoting civilisation amongst the native tribes, Dr. Baikie's desire to return to England, and see once more his aged father, was granted; and H.M.S. *Investigator* was sent to bring him down the river in the month of September last. But he was not destined to see again his native land.

I am aware that the Foreign Ministers of this country, past and present, have been well satisfied with the efficient services of Dr. Baikie; but I regret to say that some time must elapse before the real value of those services can be made known. Whilst our deceased member made but scanty communications to us, he kept, as I understand, numerous journals descriptive of his journeys and researches, from which he doubtless intended to compose a complete work had he not been unhappily cut off at Sierra Leone, where he halted for a few days only. These documents, now in the Foreign Office, are undergoing a revision under the hands of the accomplished African traveller, Dr. Kirk, and it is to be expected that they will throw important light on the geography and natural history, as well as upon the statistics and customs of the natives of that part of Africa.

In successfully braving the dangers of the climate during so many years (for he was in good health when he left the Niger), Dr. Baikie has demonstrated that a small British settlement may be made a real centre of civilisation in a barbarous African region. The alliances

which he made with various chiefs, the moral influence which he exerted over them, and the good-will if not friendship of the natives which he acquired (his messengers and people travelling in perfect safety from Lukoja to the sea-coast), are the best tests of the value of his kind and conciliatory but firm and judicious conduct. The Orkney Islanders may well be proud of having produced such a man, and I trust that the right feeling which has guided his friends to erect a monument to his memory in his native town of Kirkwall will induce Her Majesty's Government to honour his services by aiding his bereaved family with a befitting recompense.

Mr. Hudson Gurney.—By the death of this excellent man, at a great age, the cultivators of literature and archæology have lost one of their best supporters, whilst we lose an accomplished comparative Geographer. My old friend, Mr. Hudson Gurney, had, in early life, the great advantage of having, as his college friend and instructor that shining light, the late Dr. Thomas Young, who in subsequent years revealed to us the lost language of hieroglyphics, and who having expounded the great and novel theory of the undulations of light, justly obtained the never-to-be-forgotten *sobriquet* of "Phenomenon Young." Soon after leaving Cambridge Mr. Gurney travelled in Greece with the late Earl of Aberdeen, and thus became, as well as that nobleman, a true Athenian in his appreciation of the fine arts and knowledge of the most enlightened of all the Grecian people.

It falls to the lot of Earl Stanhope, the President of the Society of Antiquaries, to do justice to the merits of Mr. Gurney as a scholar and a virtuoso; whilst it is my special business to record that, as a collector, his invaluable library contained a most instructive assortment of maps of successive periods. So interested was he in the discoveries of Speke and Grant in the interior of Africa, and the approaching settlement of the great question of the Sources of the Nile, that he caused copies to be made of ancient maps of Africa, preserved in the Papal Libraries of Rome, in order to indicate the earlier state of our knowledge in that part of the world.

Serving many years as a Member of Parliament, and proving himself to be a sincere philanthropist by countless acts of charity and kindness, it may be confidently said of Hudson Gurney that in his long and well-spent life he ever gained friends and never made an enemy.

Rear-Admiral the Honourable Henry Anthony Murray.—By the death of Admiral Henry Murray, on the 17th of last February, the

Society has lost one of its warmest supporters. He served for several years in our Council, and seized every opportunity within his reach of advancing our best interests. No man of my time was more justly popular; for with his lively and joyous manner Henry Murray inspired his numerous friends with a kindred geniality. He had been for some years a severe sufferer from attacks of gout, one of which carried him off suddenly, to the deep sorrow of every one who knew his worth. I cannot do greater justice to his memory than by referring my hearers to a most lively, feeling and faithful sketch of our deceased associate, by one of his intimates,* which is given in the 'Spectator' of March 4th, p. 241. "There was" (says the reviewer towards the end of the sketch) "a singular breadth of sympathy and kindness of heart about the man himself, which was catching to all who came within his influence. It was impossible to remain shut up in the company of a man so unreserved and natural; to be otherwise than kindly and good-natured in the presence of one who had not a dash of littleness, or meanness, or ill-nature in his whole composition; and the better you knew him the more you found out the depth of those qualities. No man of his means was more truly generous, though you might have known him long and well without detecting it except by chance; and while he helped all who were in temporal need with a large hand, he had always a ready ear for those who were in other kinds of trouble. With no claim to wit or wisdom beyond the common run of educated men, we cannot but think that he will be more missed than many of the wittiest and wisest."

Mr. Joshua Bates.—Belonging to the class of merchant princes of our metropolis, Mr. Joshua Bates was always a good friend of our Society and a just appreciator of the advantages derived from our pursuits. Intimately connected with the United States as a member of the great house of Baring, Mr. Bates's hospitable mansion was ever as open to the natives of the great Transatlantic Republic as it was to his numerous friends in this country, among whom I was proud to be enrolled; for I never met with any one more ready to contribute by his good-will and his purse towards the promotion of every good scientific, literary, or philanthropic cause. Among the deeds which will cause his name to be remembered, is the foundation of the great public library of Boston, in the United States, to which he contributed twenty thousand pounds.

* Mr. Thomas Hughes.

Having been a resident in various countries, he had a truly cosmopolitan heart, and in seeking to promote peace and good-will among men, his genial temperament so endeared him to those who had the good fortune to know him, that his memory will long be cherished. His only daughter having married that eminent scholar my friend M. Van de Weyer, the Belgian Minister, the large fortune amassed by Mr. Bates will descend to the children of that sound diplomatist, who has so thoroughly identified himself with the best feelings and has gained the respect of all Englishmen.

Archdeacon Burney.—Grandson of the author of the 'History of Music' and son of a distinguished Greek scholar, Charles Parr Burney was born in 1785, and was therefore when he died, in November last, in his eightieth year. This venerable, highly respected, and most companionable man, who was one of the original members of this Society, was from his youth a promoter of science, and became a Fellow of the Royal Society as early as the year 1814, under the presidency of Sir Joseph Banks.

Mr. Samuel Cartwright, f.r.s.—Eminent as a surgeon-dentist, the late Mr. Cartwright lost no opportunity of advancing the Fine Arts by a liberal and well-timed expenditure of his means. When British Art had few patrons, this generous amateur gave what was then considered the handsomest price for any picture which he esteemed, and I well recollect when a beautiful painting by Edwin Landseer and Calcott was exhibited at the Royal Academy, that on asking the late Marquis of Lansdowne if he had secured it, "No," his Lordship replied, "I cannot cope with Mr. Cartwright."

Mr. Cartwright's hospitality was hearty and profuse, and I have myself met at his table on the same day, an ex-king, two dukes, and other persons of rank, with several of my associates in science. He was a warm-hearted, benevolent man; and, with many of his old friends, I was much grieved when he was seized with a paralysis some years ago, from which he never completely recovered. He died on the 11th June, 1864. He was a Fellow of the Royal Society and of other learned bodies.

Benjamin Silliman.—This time-honoured Professor of the United States, whose excellent 'Scientific Journal' had and still has a very wide circulation in America and Europe, died in November, 1864, at New Haven, in his eighty-fifth year.

An ardent promoter of science, and a lecturer on Chemistry, Mineralogy, and Geology, he visited Europe in 1820, and afterwards published his travels in England, Ireland, and Scotland. When he

revisited this country in 1851, I was much gratified in making the personal acquaintance of this distinguished American, who, although then in his seventy-second year, still retained a vigorous mind and an active body, and captivated a large circle of friends and admirers by his amiable manners.

Mr. Thomas Young.—Though not a professed Geographer, my valued friend, Mr. Thomas Young (who died on the 11th October last), was so staunch a supporter of our Society, and had played so useful a part in public life, that I naturally wish to record his good qualities, however briefly. Born at Dunse, in Scotland, in the year 1784, he first pursued a maritime life, and having acquired a small independence, became a resident in London, where, betaking himself to literary pursuits, he was entered as one of the original members of the Athenæum Club. When the late Duke of Devonshire proceeded as Ambassador Extraordinary to St. Petersburg to congratulate the Emperor Nicholas on his accession to the throne of Russia, Mr. Young was in his Grace's suite. On that occasion he so attracted the notice of Lord Morpeth, afterwards Earl of Carlisle, that that accomplished and kind-hearted nobleman, being struck with his sagacity and capacity for business, afterwards befriended him by inducing Lord Melbourne to appoint Mr. Young his Private Secretary. In transacting the duties of that office Mr. Young obtained the good will of every one with whom he came in contact, and lost no opportunity of rendering popular the administration of his respected chief, who, in recompence for his zealous and effective services, appointed him to the office of Receiver-General in the Post Office.

Let me add that Mr. T. Young was beloved by a very large circle of acquaintances, in whose name and my own I offer this imperfect tribute to his memory to his widow, who thoroughly estimated the worth of so meritorious a man.

John George Phillimore was the eldest son of Dr. Phillimore. He was educated at Westminster School, and obtained a second-class in classics at Oxford in 1827. In 1832 he was called to the Bar, was elected Lecturer on Jurisprudence at the Middle Temple in 1850, and Reader of Constitutional Law and Legal History in 1852. He was the author of 'History and Principles of the Law of Evidence' (1850), of 'Private Law among the Romans,' and of the first volume of a 'History of England during the Reign of George III.' Mr. Phillimore was a ripe scholar and a bold and earnest writer.

Henry CHRISTY had devoted many years to the study of the manners and customs of various races of men, and travelled extensively with this object in view. He explored all parts of Mexico, and also carefully examined the ethnology of North America, Northern Africa, and Scandinavia. He made numerous contributions to the collections in the British Museum, and latterly paid much attention to questions connected with the antiquity of man. With this object he investigated the caves in Dordogne, and made numerous important discoveries. Mr. Christy died suddenly in France; but not before he had been selected by the Council of the Royal Society as a Fellow of that body. His loss will long be felt by his fellow-workers in the interesting field of research which he selected for special study.

Admiral Sir James STIRLING entered the Navy in 1803, and attained his post-rank in 1818. In 1828 he took command of an expedition intended to form a colony in Western Australia, and he remained there as its first Governor until 1839. He subsequently commanded the *Indus* and the *Howe* in the Mediterranean, and was commander-in-chief on the China station during the war with Russia.

Mr. George DODD.—Mr. Dodd, formerly Member of Parliament for Maidstone, though not a writer in any department of science, was a praiseworthy and steady supporter of Science and Archæology, who acted as an efficient man of business in the conduct of the affairs of the Societies of which he was a member. This was conspicuously exemplified in the strict performance of his duties as a Manager and Visitor of the Royal Institution.

Vice-Admiral ROBERT FITZROY, C.B.—The melancholy task of sketching the characters of our deceased Fellows, several of whom were my intimate friends, had been completed when, alas! the mournful news of the death of one of the most distinguished of our Geographers burst upon me. The shock which this catastrophe gave to the general public was necessarily more afflicting to myself and numerous friends who had long known and highly estimated Robert FitzRoy.

A grandson through his father—Lord Charles FitzRoy—of the sixth Duke of Grafton, and by his mother the grandson of the first Marquis of Londonderry, young FitzRoy, who was born in 1805, entered the Navy in 1819, and obtained a Lieutenancy in 1824. After serving in the Mediterranean and South American stations he became Flag-Lieutenant of Admiral Sir Robert Otway on the

latter station, and was made Commander in 1828. I will not here attempt to trace all the public events in the chequered career of my lamented friend, for he was once in Parliament and afterwards Governor of New Zealand; but will dwell simply upon the two brilliant and eventful periods of his life which connect him with this Society,—his researches of eight years' duration in the surveying ships on both coasts of South America, and his recent labours as the Meteorologist of the Board of Trade.

One of the original members of our Society, FitzRoy won distinction as a geographical explorer so early as 1829, and of this we have a record in the first volume of our 'Transactions,' when that first-rate Naval Surveyor Captain Philip King, under whom he was trained, gave young FitzRoy all credit for his discovery of the Otway Water in the Straits of Magellan, and even named one of the chief sea-passages, FitzRoy Strait. We who were interested in all the contributions to Natural knowledge brought home by FitzRoy in 1831, can never forget the excitement which was produced in this metropolis by the arrival with him of a family of wild Fuegians. Prompted by a chivalrous philanthropy, FitzRoy expended, indeed, much of his private means in an endeavour to improve these poor people, and in imparting to them the blessings of Christianity; and, not only were they well cared for in England, but he had even engaged a vessel to take them back to their native land at his own cost. Being appointed in the mean time Commander of the *Beagle* on a second expedition, he took them with him loaded with presents and established them in their own country.

From 1832 to 1836, he continued the survey of the coasts of South America and the Falkland Islands, commenced by King, and completed it up to Guayaquil, on the west coast. The Geographical and other results of his prolonged voyage were finally laid before the public in 1839, in three volumes, accompanied by a valuable appendix and maps. The first volume relates to the earlier researches of the expedition when under the command of that truly scientific officer Captain Philip King, who, seeing how vastly FitzRoy afterwards extended the survey, generously assigned to him, although his subordinate during the first two years, the privilege of publishing the whole as a connected work. The third volume consists of the highly-prized Natural History and Geological results of the voyage, from the pen of Charles Darwin, who was associated with FitzRoy as naturalist of the expedition. Such was the wealth in scientific results gleaned during this memorable voyage,

that Darwin was led, in addition to the Natural History volume of FitzRoy's work, to publish in subsequent years three other works, in which he opened out entirely new views in Geology. These were, a treatise on Coral-reefs (1842), one on Volcanic Islands (1844), and his remarkable and philosophical observations on the Geology of South America (1846). It may be confidently said, that FitzRoy's voyage of the *Beagle* produced a harvest of fresh knowledge which from the combination of geographical, physical, and natural history results, is unparalleled in this century, and some of the best effects of which have been from year to year coming forth in the writings of Charles Darwin.

Such a grand feat as the surveying voyage of the *Beagle*, naturally excited the deepest admiration of all cultivators of science, and of Geographers in particular; and as one of those events in my own life of which I am justly proud I may be permitted to record, that I had the honour, in the year 1836, of moving in our Council the award of our then single Royal Medal to Captain FitzRoy. This conscientious Surveyor, unwilling to quit his South American station without rendering his services in every sense complete, had hired two additional vessels at his own cost, to finish off the examination of the coasts of the Falkland Islands, and subsequently purchased a third, besides fitting out the *Beagle* to a great extent at his own expence. But, as these gratuitous and noble efforts which cost him several thousand pounds had not been sanctioned by the Admiralty, he was never reimbursed; and being thus disappointed by the conduct of his rulers, he the more deeply appreciated, as he himself assured me, the full and ample recognition of his services bestowed on him by the Geographers in conferring on him their Gold Medal.

In the latest years of his life his acquirements as a Meteorologist, and his well-timed observations and suggestions, induced the Government to institute, under the Board of Trade, a Meteorological Office, superintended by Admiral FitzRoy, in the management of which he established the announcement to distant ports of coming storms, as gathered by telegraphic communication recording conjunctions of atmospheric phenomena at great distances. The labour which he bestowed in methodizing and classifying all the known data, and the skill with which he organized his new system of telegraphic forecasts, and the method he established of storm signals or warnings for the prevention of shipwrecks, deservedly obtained for him the thanks of the country and specially of all those engaged in mercantile and maritime pursuits.

Few as are yet the laws which Meteorologists have been able to establish beyond those of the storm-gyrations elaborated by Maury and Reid, Admiral FitzRoy has proved that even out of the variable and uncertain elements with which he had to deal, he could derive a great practical public benefit. The machinery which he contrived will now it is hoped only require the superintendence of a manager who will steadily guide the helm of the FitzRoy Weather Ship.

Besides his various labours, including the forecast of storms, Admiral FitzRoy has left behind him a great accumulation of precious documents respecting tides, currents, winds, and other phenomena of the ocean, which he has procured from the logs of ships in many quarters of the globe, thus following out the system of Captain Maury: and it is to be hoped that these documents may be turned to a really useful account.

In deploring the loss of this eminent man who was as truly esteemed by his former chief, the Prince of Naval Surveyors, Sir Francis Beaufort, as by his successors, I may be allowed to suggest that if FitzRoy had not had thrown upon him the heavy and irritating responsibility of never being found at fault in any of his numerous forecasts of storms in our very changeful climate, his valuable life might have been preserved. Being of a high-strung nervous temperament, and imbued with the loftiest sense of honour and fidelity to his charge, and agitated with over-work, the strain proved too great for the brain, which had surmounted so many difficulties, and the spirit of this high-souled man fled from this world, to the grief of his many friends and admirers, the anguish of his widow, and the deep regret of all his countrymen. I have only to add that, on the representation that this gallant officer died in impoverished circumstances, the First Minister of the Crown has promised to bestow a pension on Mrs. FitzRoy.

Admiral FitzRoy was a Companion of the Bath, a Fellow of the Royal, Astronomical, and other Societies, a Corresponding Member of the Institute of France, and had received honorific distinctions from several Foreign Sovereigns.

In addition to those deceased Fellows of the Society already alluded to, we have lost many good supporters, who, not directly connected with our pursuit, had attained positions in life which entitle their memory to respect. Thus, among Members of Parliament, there are the names of Mr. E. Divett, Mr. Samuel Gregson, and Sir Henry Willoughby, all of whom have proved themselves

worthy of the places they occupied; also Sir John Login, the accomplished Mentor of the Majarajah Duleep Singh, and Mr. Charles Dilke, the respected proprietor of the 'Athenæum' Journal.

The remainder of this mournful list (unusually large this year) is composed of the following names:—Mr. P. Anstruther, Sir A. Bannerman, Dr. Bird, Mr. E. Burmester, Mr. S. Cunard, Mr. A. B. Cator, Mr. H. D. Erskine, Mr. Stanhope Freeman, Capt. Gascoigne, Mr. M. Gore, Mr. G. A. Hoskins, Mr. T. C. Janson, Mr. J. Kalergi, Mr. J. G. Lumsden, Mr. Edward Lane, Mr. W. Moon, Mr. Joseph Martineau, Mr. R. C. Marsden, Mr. John Macdonnell, Major-General Matthie, Mr. R. R. Notman, the Rev. W. Oxenham, Mr. R. A. Long Phillips, Sir John H. Pelly, Mr. John Innes Pocock, Professor Rafn, Professor W. Ramsay, the Rev. Carter Smith, and Mr. G. Stoddart.

## ADMIRALTY SURVEYS.*

The Admiralty Surveys, both on our own and on foreign coasts, have made fair progress during the past year: the hydrographical examination of the shores of the United Kingdom has indeed been so far completed that it has been considered desirable to break up some of the small parties which had been employed in special localities and over limited areas, and to adopt a more comprehensive system with the view to meeting those changes which through time and the operations of Nature must ever be recurring on such a coast as ours.

Two small, but suitable and efficient, steamers have been accordingly set apart by the Admiralty for this purpose—the *Lightning*, under an able surveyor, Captain E. J. Bedford, and the *Porcupine*, under Staff-Commander Calver—and thus those labours will be continued which have hitherto proved of so much advantage to commerce and added materially to the security of life and property. These two vessels, together with the Channel Islands Survey, which is conducted by boats, with the occasional assistance of a steamer, and a small establishment to observe and record the changes which are being produced by artificial means at and near our great naval arsenal, Portsmouth, will constitute the home surveying force for the present year.

Some modification of the system on which our foreign surveys

* By Captain G. H. Richards, R.N., Hydrographer.

are conducted has also been introduced, and, if found to succeed, will probably be extended. This consists in appropriating one of the small ships of war on each station as an auxiliary surveying vessel, being commanded and officered out of that branch of the profession, and hence available for any extraordinary duties that may be required. The rapidly-increasing commerce with China, and the vast extent of its yet partially-explored coasts, point to that country as the first where this auxiliary force may with advantage be employed: and therefore, in addition to the two vessels exclusively engaged on surveying service there, H.M.S. *Serpent*, under Commander Bullock, an officer of much experience in the China Seas, has just been despatched to that station.

*English Coast.*—Staff-Commander Calver has extended his examination of the estuary of the Thames along the coast of Suffolk, and has prepared the way for a re-survey of the shoals and channels between Lowestoft and Yarmouth,—a work which is imperatively called for. He has likewise made considerable progress towards the completion of an entirely new survey of the Downs, which from the great changes which were found to have taken place was also much needed, and will be completed during the early part of this season. The re-survey of the estuary of the Thames by this officer, and which was noticed as having been completed in our last Report, is now published, and is, perhaps, one of the most important aids to navigation which has been given to the world for many years.

Captain George Williams, of the *Basa*—one of our oldest and best surveyors—having retired early in the season, his place was filled by Staff-Commander Usborne, who has been employed in completing the deep soundings off the coasts of Cornwall and Devon and on other useful work.

The south shore of the Bristol Channel, between Combemartin and Watchett, has been closely sounded by Commander D. Aird and his two assistants in the *Asp*, and is a work which will prove of much utility to the rapidly-increasing trade of that part of the kingdom.

Commander Brooker has made a very close re-survey of the bar of Portsmouth Harbour to ascertain the effect produced by the dredging of the previous year, which has satisfactorily proved that much benefit in an increased depth has resulted, and that more, and of a permanent character, may confidently be expected from further operations.

Captain E. J. Bedford and his five assistants have completed the

surveys of the islands of Coll and Tyree, off the west coast of Scotland, and have also surveyed Loch Sunart, on the main, both on a a large scale and with great minuteness, and have thus brought to a close the in-shore examination of this deeply-indented and intricate coast-line; while Mr. Stanton, Master, R.N., with one assistant, in the *Shamrock* gunboat, has carried the off-shore soundings to an average distance of 60 miles from the coast between Ireland and the Hebrides, embracing an area of 3600 square miles,—a work which required both skill and perseverance. Mr. Stanton, in the course of this service, discovered several fishing-banks of considerable extent and value in the same neighbourhood.

The survey of the Channel Islands, under Staff-Commander John Richards, has progressed steadily and satisfactorily. The intricate nature of this work, studded as the coasts are with innumerable hidden dangers, will be better estimated by an examination of the chart and a knowledge of the difficulties to be encountered than by any written description.

*Foreign Surveys.*—The Mediterranean surveys have been carried on during the past year by Captain Mansell in the *Hydra*, and Commander Wilkinson in the *Firefly*. The former has been employed on the western coast of Greece, and has examined the mainland from Murtza Bay to Oxia Island, together with the southern shore of the Gulf of Patras and the islands of Santa Maura, Cephalonia, Ithaca, with some smaller adjacent ones. Plans of the Strait of Prevesa, Roadstead of Santa Maura, Port Vliko, Argostoli Harbour, Gulf of Molo, Patras Road, and Ports Platea and Petala, have been received from him and will be published with all convenient speed. Commander Wilkinson, in the *Firefly*, has been employed in sounding the Malta Channel and determining the true position of actual dangers or expunging doubtful ones which were shewn on the charts. He has also re-surveyed a considerable portion of the coast of Tunis, where many inaccuracies were found to exist, as well as the western portion of the island of Sicily and its off-lying dangers.

*Newfoundland.*—Captain Orlebar, after an active service of thirty years on surveying duties in the St. Lawrence, the coasts of Nova Scotia and Newfoundland, has retired and been succeeded by his chief assistant Mr. J. H. Kerr, Master, R.N., an officer favourably known by his works in New Zealand, China, and other parts of the world. The work performed by Captain Orlebar and his two assistants during the last year includes the greater part of Trinity Bay, in Newfoundland, with a portion of the coast between it and

Cape Bona Vista, as well as plans of Trinity Harbour and Heart's Content, the latter being the proposed terminus of the Atlantic cable. They have likewise examined the inner edge of the Grand Bank off Cape Race, and Captain Orlebar has afforded his counsel and assistance in the selection of the termini for the Atlantic cable, and that between Newfoundland and Nova Scotia.

*Nova Scotia.*—By the exertions of Captain Shortland and his five assistants but little remains to complete the coast survey of this colony, which, it is believed, will be brought to a close during this year: but notwithstanding that an area of 4000 square miles of deep sounding has been completed during the past season, there yet remains a very considerable examination of the banks to be made before the approach to this coast, which is enveloped in fog for so many months of the year, can be considered free from danger.

*West Indies.*—Mr. Parsons, Master, R.N., with his two assistants, has been employed in surveying the coasts of the island of Tobago, and, considering the limited means at his disposal and the delays incident to an unhealthy season, they have made favourable progress. Captain Pullen is still employed in examining the coral-reefs of the Bermudas principally with a view to the removal of obstructions, rendered necessary by the increased length and draught of modern ships. He also has been much retarded in his operations by the severe epidemic which raged at Bermuda during many months of 1864.

*British Columbia.*—Mr. Pender, Master, R.N., with his three assistants, are making very favourable progress with the examination of the northern portions of this colony, and the results of their labours, together with the latest surveys of the sister colony of Vancouver Island, are being promptly placed before the public.

*Australia.*—Four distinct surveys, under the conduct of naval officers, are being carried on in these colonies, at the joint expense of their Governments and the Admiralty. In Victoria, Commander Cox, with his three assistants, having completed the extensive estuary of Port Phillip, with its various anchorages, on scales of 6 inches to a mile, is proceeding with the examination of the coast to the eastward. The preparation of the charts is in a very forward state, and they will shortly be issued to the public. In New South Wales considerable progress has been made, Commander Sidney and his two assistants having during the past season almost completed the coast between the Solitary Islands and Point Danger (the northern boundary of the colony), and these coast-sheets of this

survey are being published with due despatch. Staff-Commander Jeffery, in charge of the Queensland Survey, with one assistant, has completed the survey of Keppel Bay and part of Sandy Strait, the latter of which is published.

*South Africa*.—The survey of the coast of the Cape of Good Hope Colony, under Mr. Skead and his assistants, is in progress, and during the last season Plettenberg Bay and other portions have been surveyed; but owing to the difficult and exposed nature of this coast, together with the limited means employed and other unavoidable drawbacks, its progress has not been so rapid as could be desired.

*China and Japan*.—Commander J. Ward, in the *Rifleman*, has been employed in the examination of the numerous dangers which stud the China Sea, and in making clear the two great highways between Singapore and Hongkong. The positions of the Vanguard, Prince of Wales, Alexander, and Granger banks have been correctly determined and their localities carefully sounded. The non-existence of some imaginary dangers has also been proved and their names removed from the charts. The *Swallow*, under the command of Mr. Wilds, Master, R.N., with her tender the *Dove*, Mr. Stanley, has been employed on the northern coasts of China. They have completed a re-survey of the entrance to the Yang-tse-Kiang, which has been published, and have added considerably to the soundings off the coast between Hongkong and Chusan, as well as in the Formosa Channel, and have surveyed the port of Swa-tau. The operations of these vessels have, however, been somewhat retarded during the past season by the local disturbances in China.

During the year 1864 sixty-nine new charts have been engraved and published by the Hydrographic Office of the Admiralty, while additions and corrections have been made to about 1400 former ones. The number of charts printed during the year has been 203,770. The annual tide-tables and lists of lights, together with seven new books of sailing-directions and numerous pamphlets and hydrographical notices, have likewise been published, as well as a series of azimuth tables, by Staff-Commander Burdwood, showing the sun's true bearing for every four minutes of time between the parallels of 48° and 56° of latitude.

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*Review of the Progress of Geographical Knowledge since the Foundation of the Society*.—I should not have ventured to undertake a retrospective view of the progress of Geography since the foundation of

our Society, had I not been supported by the labours of some of my associates, of whom I must particularly mention that accurate geographer, Mr. A. G. Findlay, who has furnished me with the details and coloured statistical maps respecting Australia.

The new discoveries, and their results, which have been made in the last third of a century, have, from their area and importance, been unexampled in our history, even when contrasted with former periods of much greater length; albeit from the days of Elizabeth to those of George the Third many brilliant enterprises were carried out, which reflect glory on the adventurous spirit of England. With the surprising advance made in our own times, it is my pride, as your President, to say that our Society has been intimately connected, partly through the encouragement held out to travellers by our rewards and the publication of our volumes, and greatly by the impulse we have given to many enterprises originated among us, arising from that happy mutual intercourse and good-fellowship which has ever shone forth in our body.

Allow me, then, to remind you that when, in 1830, this Society was established, and when our founder, Sir John Barrow, assisted by a few individuals, drew up those laws* by which we have since been guided, the state of geographical science was very different indeed from what it now is. At that period the magnificent surveys by sea and by land, now so far advanced over many parts of the world, had barely been commenced, even in Eastern and Southern Europe, and the grand Asiatic possessions of Russia were most imperfectly developed. Asia Minor had been little traversed by men of science or scholars, whilst we knew less of Syria, the cradle of Christianity, than we now do of parts of Inner Africa. Of China, shut out as it was from the rest of the world, we had only a dim perception, chiefly through Jesuit missionaries: Japan, as a whole, was utterly unknown, except the neighbourhood of a Dutch fort and colony. The mountainous regions of Northern India had been only partially

* The first Committee which assembled to draw up those laws by which the Society is still governed, consisted of our leader Sir John Barrow, the Hon. Mount-Stuart Elphinstone, Sir John Cam Hobhouse, now Lord Broughton, Mr. Robert Brown, the renowned botanist and companion of Flinders, and myself. We were all members of the then Raleigh Club of Travellers, in which the scheme of a Geographical Society was first mooted. In the same year my eminent friend Admiral W. Smyth, C.B., to whom, as our former President, the Society was intimately indebted for the presidency during which our present prosperity began, also sketched out the project of a Geographical Society and enrolled many names. These projects were merged in one when Sir J. Barrow engaged the Earl of Ripon to become our first President, as stated in our first volume, in which no notice, however, is taken of the origin of the Society.

explored, and we then had no idea of the striking fact that the culminating peaks of the Himalayas far exceeded in height those of the Andes. Australia, now among the most advancing of British colonies, was, as regards its vast interior, nearly a perfect blank; and the coasts of New Zealand had been visited only by a few whale-fishermen and missionaries. When we turn to Africa we are compelled to admit that in 1830 we were even ignorant of much that was described by Ptolemy. Thus the course of the Nile was only known up to Khartum, and that of the Niger was entirely unknown, as well as that of the great Zambesi of Livingstone. In South Africa all the interior north of the Kalahari desert was supposed to be a vast sandy wilderness, instead of what we now know it to be,—an enormous plateau of rich lands, irrigated by great lakes and streams. In North America, notwithstanding that our ancestors and their enterprising descendants, now a great and separate nation, had made wonderful progress in the knowledge of the country, a vast region in the north and north-west of the continent had been little visited, our knowledge of the latter particularly having remained stationary since the voyage of Vancouver. And lastly, with the exception of what Parry and his followers had so admirably laid before us, the Polar regions were a blank; and it was not till the chivalrous adventure of Franklin elicited the ardour of search for the remains of that heroic explorer that our national geographical distinction was raised by the delineation of vast tracts wholly unmarked on any old maps. Nor, when we began our labours, had the skilful perseverance of James Ross penetrated beyond that which was considered an impassable barrier by Cook and the earlier voyagers, and opened out to us the great Antarctic Ocean, with its lands, ice-clad mountains, and volcanos.

As I cannot attempt to recall to your recollection all those advances, of most of which records are to be found in our Journal, I must restrict myself to comments on certain points only. I commence, then, by noticing the immense strides made by the newest of the great British colonies, both because this Society has been intimately connected with all Australian discoveries for a third of a century, and because there is no example in the whole range of British history of more striking and rapid progress having been made through the energies of our countrymen.

Not now dwelling on the first discovery of this continent by the Portuguese, or the subsequent examination of its coasts by the famous Dutch navigator Tasman, nor even adverting to the

voyages of Cook, and the first partial settlements, including the origin of the earliest colony, that of New South Wales, let me confine my view to what was the condition of this vast country when our Society was originated. In this way we may well notice some results of the most memorable Australian explorations, the leaders in which this Society has invariably rewarded with its medals and testimonials.

In 1830, the year of our foundation, the only great colony we possessed in Australia (for Swan River Settlement, now West Australia, had only just been formed) was New South Wales, which had a population of near 50,000 inhabitants, spread at wide intervals over an area of about 34,500 square miles, whilst the utmost extent of distant tracts loosely reported upon did not exceed in all 82,000 square miles. It was during the government of our gifted associate, General Sir Thomas Brisbane—a good astronomer and a distinguished lieutenant of Wellington—and also under his successor, Governor Darling, that due encouragement was given to explorers to penetrate beyond those mountains or ranges of hills which in Eastern Australia form a "Cordillera."* This effort, commenced in 1814, led only to the impression that the Macquarie and Lachlan Rivers terminated in marshes, and that the whole of the interior would be found to be a shallow basin of water, if not a great inland sea.

In the second volume of our Journal Mr. Allan Cunningham gave us a clear account of the progress of exploration, including his own successful journey of 1829. The aggregate, however, of all the travels then made by various individuals did not exceed the number of miles which single travellers, such as Sturt, Eyre, Leichhardt, A. Gregory, MacDouall Stuart, M'Kinlay, Landsborough, Burke and Wills, and others, have since accomplished. But the encouraging sketches the earliest explorers gave of well-watered tracts, and of grounds well suited for sheep pastures, naturally led to further researches, and a greatly-extended occupation.

In Western Australia the new settlers at Swan River had made but slight efforts to penetrate into the interior, and all the knowledge of this region which we then possessed is given in the first memoir, a very striking one, published by this Society.† In

* In the President's Address of 1844, I first applied the term "Eastern Cordillera" to this range, so well described by Strzelecki.

† 'State of the Colony of Swan River, from Capt. Stirling's Report.' By John Barrow. 'Journal Royal Geographical Society,' vol. i. p. 1.

Northern Australia the temporary posts (for they were not settlements) occupied in Apsley Strait and Port Essington added scarcely anything to our acquaintance with the interior.

Such was the state of geographical knowledge respecting Australia when this Society arose. We had then, thanks to the surveys of that excellent hydrographer, Flinders, a pretty exact knowledge of the eastern and southern coasts and also of portions of the north coast; but of the vast interior we scarcely knew above a fortieth part, and most of that only as derived from the imperfect observation of the first rude explorers. Discussions were then, indeed, much in vogue among us, as to the real nature of the great unknown interior, which it was supposed would prove to be either a desert or possibly great inland sheets of water, according to the observations of travellers in alternating seasons of drought and rain. The one thing, however, which was established was, that flocks of sheep could be successfully pastured far in the interior, and thus the occupation of new lands was rapidly augmented.

In an extended geographical sense the first clue to the true nature of the interior was obtained by Capt. Sturt, the patriarch of the explorers of Inner Australia. After a first journey in 1828, and his discovery of the Darling, this meritorious officer, who was afterwards justly honoured with our Medal, pushed on beyond the Murrumbidgee, and, embarking on a noble stream, which he called the Murray, sailed down it to Encounter Bay, upon the southern seaboard. This long journey of more than 2000 miles, through hitherto unknown lands, opened out new vistas for the geographer and the colonist. To the one it made known a grand water-system of which we had been totally ignorant, and to the other it presented the prospect of establishing a colony towards the mouth of the great stream; and hence South Australia was founded in 1834.

We next had to dwell with deep interest on the researches of our associate Eyre, who, in 1837, discovered and passed over those extensive plains which lie to the north of the present colony of Victoria. Baffled in a subsequent endeavour to penetrate northwards by a belief in the existence of the great watery depression called Lake Torrens, he next, by the advice and encouragement of Governor Gawler, proceeded to the west, and made that journey along the southern coast lying between South and West Australia, which, for resolution under the severest privations, is scarcely to be paralleled in the annals of research.

This arduous journey proved the non-existence in all that region of any rivers emptying themselves into the sea, and the saline and barren condition of the country he traversed. These large additions to our geographical knowledge were of course duly recognised by presenting our Gold Medal to Mr. Eyre, now worthily the Governor of Jamaica.

On the western coast the infant colony had made little progress for some years, when two young officers, Lieutenants Grey and Lushington, panting to do something in those piping times of peace, endeavoured, in 1837, to penetrate into the interior from the north-western face of the continent. How they discovered new rivers, the chief of which they called after Lord Glenelg, the liberal and enlightened Minister of the Colonies, who sent them out, and another stream after myself, because I had been their zealous supporter, is recorded in our volumes, as well as how their survey was eventually put an end to through the hostility of the natives. Yet this expedition led to good results; for, by identifying himself with Western Australia, Lieutenant Grey became eventually ~~its~~ Lieutenant-Governor, and there acquired so much reputation as eventually to be appointed Governor of New Zealand, afterwards of the Cape of Good Hope, and again Governor of New Zealand.

During the period of these expansions of geographical knowledge, the germ of the now rich province of Victoria had been sown. As early, indeed, as 1803, a few stragglers from Van Diemen's Land, now Tasmania, had squatted on the present site of the flourishing city of Melbourne. But this effort under Governor Collins failed; and it was not until this tract was again occupied—nor, indeed, until the opening out of its auriferous wealth—that the Colony became so very important.

The favourable account given by that skilful and indefatigable explorer Sir Thomas Mitchell, the Surveyor-General of New South Wales, of the country which had ever lain in its primeval solitude, determined Sir R. Bourke, the Governor of New South Wales, to take regular possession of it, though at that time no suspicion existed that gold abounded in the territory.

Shortly after the establishment of the new Colony now called Victoria, my distinguished friend, Count Strzelecki was occupied during five years, and entirely at his own cost, in exploring nearly the whole of the hilly region of Eastern Australia, from the high mountain which he named Mount Kosciusko on the south, at an altitude of 6510 feet above the sea, to the northern tracts now

forming part of the new Colony of Queensland. In his excellent work descriptive of the geological structure of New South Wales, and also of Tasmania, he indeed made no mention of the existence of gold, and the reason has since transpired. He had discovered gold, but was bound to secresy by Governor Sir G. Gipps, who feared the effect of the announcement of such a phenomenon in the midst of a rural and pastoral population, among which were many convicts.*

Before the Colony now called Victoria attracted so much attention from the great amount of its auriferous wealth, the parent Colony of New South Wales was fully alive to the solution of great geographical problems respecting the vast unknown interior. The most striking of the attempts was that made by Dr. Ludwig Leichhardt, who left the station of Moreton Bay (now the thriving Colony of Queensland), in October 1844, and arrived at Port Essington, in North Australia, after a journey of thirteen months, in which he passed through many districts admirably adapted for settlers, large portions of which have since been occupied, and are now pastured by sheep. This grand work obtained our warmest approbation, and the donation of our Gold Medal in 1846. But before this time the

* At that time I was exploring Russia and the Ural Mountains, and in the latter region had full opportunities of studying the character of the auriferous rocks. Making the acquaintance of Count Strzelecki on my return, I was gratified by him with an inspection of all the characteristic rock specimens of Eastern Australia described in his work, then about to be published (1844); and I at once expressed to him my belief, that, from this resemblance to the Uralian rocks, Eastern Australia would prove to be an auriferous region. Convinced that gold would be found there, I urged the Cornish tin-miners, then (1846) much out of employment, to emigrate, and dig for gold in Australia; and in 1848 I received specimens of the ore from two of those emigrants. Thereon I wrote to the Secretary for the Colonies, pointing out that my hypothesis had been proved to be an important fact, and suggesting that means should be taken to regulate and methodize the opening out of gold works, or that great confusion might ensue. The Government considered it prudent to keep the fact secret, as its announcement might throw into confusion a great pastoral country. I, however, persevered in expressing my belief of the coming shower of gold, in a memoir read to the British Association, in a lecture at the Royal Institution, and in an article in the 'Quarterly Review,' entitled 'Siberia and California, 1850.' These views were all promulgated anterior to the year 1851, when Mr. Hargreaves, by first practically opening up the gold diggings, caused a sensation almost equal to that which pervaded the civilized world when the precious metals were first discovered in America. I merely allude to these facts, not to claim any merit for myself except that which is due to a fair geological induction from the data known to me at a time when I was in entire ignorance of any discovery of gold having been made. The proof of my ignorance in 1844, that anyone had discovered a fragment of gold in Australia, is seen in the language I used in that year, being then your President, when I expressed my surprise that no gold had yet been detected in rocks, which, according to analogy, ought to have afforded it. It is right also to make this statement quite clear, in justice both to my valued friend Count Strzelecki, and also to the Rev. W. B. Clarke, both of whom had, as it afterwards appeared, really discovered gold, though neither of them published the fact, and they certainly gave me no hint on the subject. The maintaining of the secresy which was imposed by the Governor of New South Wales was rigidly observed, and was highly honourable to Count Strzelecki.

veteran Sturt had submitted (in 1843) a general plan for the survey of the continent from north to south and from east to west, though this plan was much modified by his instructions. Starting with MacDouall Stuart as his aid, he traversed the lower courses of the Murray and Darling rivers in his way northward, and, after great privations, under an intolerable heat, he reached, in 138° east longitude, a sterile desert of clay. During this trying service the heat in the sun was 157° Fahr., and in the shade 132°. The hair and nails of the men, and even the wool on the sheep, ceased to grow; wooden implements were shrivelled up, and even those made of horn separated into hair-like filaments; yet the travellers preserved their health, though in the same spot the temperature soon after fell to 24° Fahr. Thus did the pluck and fortitude of our countrymen prove the adaptibility of the human frame to the most excessive variations of climate.*

Let me here remark, that at this very time our Arctic explorers were living in comparative comfort, as they thought, with a difference of temperature, as compared with the Australian heat, greater than that which exists between ice and boiling water! Captain Sturt made another and ineffectual attempt to cross the continent, in which, however, he discovered Cooper Creek, subsequently the base of operation of the ill-fated expedition under those noble fellows Burke and Wills. Having also visited the tract occupied by the so-called lake, now known to be in a dry season a desert of stones or of baked mud, the conviction was shared by most geographers, and was dwelt upon by myself in Anniversary Addresses,† that the interior country northward would probably also be found to be an unprofitable desert. This idea was indeed strengthened when Augustus Gregory, in 1856, advancing southwestward from the Victoria river of North Australia, also reached an inland saline tract. This impression, however, that all the interior was of that sterile character, has now been proved to be erroneous, particularly by the subsequent travels of MacDouall Stuart, and also by those of Burke and Wills, M'Kinlay, Landsborough, and Walker. The grand discoveries of Stuart, as well as the efforts of Burke and Wills, under the able government of Sir H. Barkly, obtained our highest rewards, whilst we conferred honorific testimonials on the other explorers.

By persevering marches northwards, it has been now ascertained,

* See 'Journal Royal Geographical Society,' vol. xvii. pp. 115-18.

† See particularly the Address of 1858.

that, whatever amount of sterile or desert land exists in the heart of the continent, the character of the country north of 27° s. lat. changes essentially, and that Tropical Australia is, on the whole, rich and fertile. But, before the last-mentioned journies were made, there was, alas! one forecast of the fate of Burke and Wills. In 1848 Leichhardt undertook a second expedition, which promised greater results than his earlier efforts, towards the north-east, by taking a more inland course. The fate of this intrepid and skilful traveller has been for seventeen years a mystery, and, recently, I learn from the celebrated botanist, Dr. Mueller, of Melbourne, the companion of Augustus Gregory in his traverse from North Australia, that he has been urging the inhabitants of Victoria to institute a new search, to ascertain the true fate of the bold and accomplished explorer and his party. In a lecture given at Melbourne in February last, Dr. Mueller recounted the various hypotheses respecting that mysterious journey, and eloquently advocated that this fresh search should be made under the guidance of the experienced traveller Mr. M'Intyre, who, having recently come from the border of the interior region in question, distinctly asserts his belief that Leichhardt's route and fate may still be discovered. The ladies of Melbourne, feeling just as keen an interest in solving this problem as we all in England did in unveiling the fate of Franklin, have commenced a subscription to fit out the requisite expedition. Heartily wishing them success, and desirous that some of our countrymen and countrywomen may join in supporting this noble effort, I cannot better aid the cause than by quoting a few of the stirring words of Dr. Mueller:—

"In the absence (says he) of all tangible evidence of his fate, it is not less wrong to maintain that Leichhardt must be dead than to assert that he must be living. We have no right to shelve the unsolved question by mere assumption. We have no right to evade exertion, which may still save him from destruction. And, even if all exertions should prove futile—even if we altogether failed to draw away the veil which hangs over Leichhardt's fate, one noble object will be gained,—we shall have displayed that chivalrous spirit to which we owe so many great and noble deeds. . . . . And with that endeavour will be mingled the lofty feeling of having advanced, simultaneously with our work of humanity, the revelation of the true nature of the interior of this vast continent." *

* To assist in this good work, a subscription list has now been opened at the offices of the Society; Lady Murchison's name being at the head of it.

The expeditions already alluded to had given us a pretty clear idea of the south-eastern portion of Australia, or about one-third of its area. In the south-western district, or West Australia, no inland excursion to the east had exceeded 200 miles from the coast, chiefly accomplished by Frank Gregory and Lieut. Helpman.

In 1853 this Society urged upon the Government the desirability of an expedition to explore North Australia; and in 1854, the Government having undertaken to promote one, four members of the party left England, to unite with Mr. Augustus Gregory their leader. Well fitted out in New South Wales, under the direction of our enlightened associate, the Governor, Sir Wm. Denison, this expedition passed from Moreton Bay, now Queensland, round the north-eastern division of the continent, and landed to the east of Cambridge Gulf, at the mouth of the Northern Victoria River. Thence, leaving a depôt under Mr. Wilson, who with his party remained there ten months, fully proving that our countrymen could there live in health, Gregory first advanced s.s.w., but, repelled by an arid country, he went eastward, over the table-lands of sandstone which separate the Victoria valley from the Gulf of Carpentaria. From the head of that great water he travelled in a south-easterly direction, bringing to light vast tracts of new and rich lands, to which the colonists of Queensland are now rapidly extending their occupation, and, with his companions, Mueller, the celebrated botanist, Mr. Elsey, and Mr. H. Gregory, he terminated his very successful journey at Port Curtis and Moreton Bay. As in this, and other expeditions, Mr. Augustus Gregory had thus travelled 6500 miles, chiefly on foot, and had determined numerous geographical positions of longitude as well as latitude, never certainly had any one established a stronger claim to our highest reward. Again, he earned our hearty praise by making another bold effort to examine the interior from the east, partly to endeavour to discover traces of Leichhardt; but the result of this endeavour was not so fortunate, for, though he issued by South Australia and Adelaide, the country which he passed to the north of Cooper Creek gave little assurance of any tract fit for occupation.

It was then that those efforts began in South Australia which have been so signally successful in exploring northwards in search of better lands. Notwithstanding the discouragements produced by the journies of Sturt and Eyre, and partial failures in the environs of Lake Torrens, MacDouall Stuart, the companion of Sturt, was nothing daunted. Aided by the speculative spirit and generous assistance of Mr. Finke, Stuart started on his first independent

journey in 1848, and traversed the country to the west of Adelaide, between Mount Eyre and Streaky Bay. Next, supported by Mr. Chambers as well as Mr. Finke, he undertook two expeditions in the environs of Lake Torrens, which had small results. In March 1860, however, he proceeded due north, with the resolve to traverse the continent to the north shore. In this, his fourth effort, he reached, after great difficulty, the very centre of the continent, and, instead of an inhospitable desert, or an inland sea, he found there a well-watered, rich, and grassy region. Pushing on to s. lat. 18° 17′, E. long. 134°, he was driven back by the hostile natives, and returned to his depôt at Chambers' Creek. Again he advanced, and gained 100 miles more, but was foiled by impenetrable forest and scrub, and then unwillingly came back to Adelaide. Still the crowning honour was to be won, and MacDouall Stuart was not the man to falter. Under the auspices, on this last occasion, of the South Australian Government and the zealous Governor Sir R. G. M'Donnell, a month sufficed to restore his shattered health, and again we find him advancing. Now, shaping his course so as to avoid the former obstacles, he finally reached the sea in Van Diemen's Gulf, and there unfurled the British flag.

I have thus dwelt for a few moments on the wonderful efforts of MacDouall Stuart, because they have brought about the establish- of a colony on the north coast of this continent—an object which has long been a dream of my own, and which I rejoice to see thus realized in my lifetime. In the year 1844, when I presided over this Society, and again in 1857, I earnestly urged the forming of settlements on the coast of North Australia, for political and commercial purposes of deep interest, showing how much we should lose if any other nation were to step in and take possession of some of those noble bays and harbours. In the last-mentioned of those years, my appeal was thus concluded:—"Let us trust, that, if such a consummation [a settlement in North Australia] be obtained, the proposers of it may not be forgotten; and that it may be remembered, that the North Australian expedition, now happily completed under the direction of Her Majesty's Government, was a child of the Royal Geographical Society." *

The northern limits to which the pasturage of sheep can be extended into Intertropical Australia has been so pointedly commented upon in my last two Addresses, as certified by the explorers

* 'Journal Royal Geographical Society,' vol. xxvii. p. 459.

Landsborough, M'Kinlay, Wilkes, and numerous new settlers, that it is unnecessary now to dwell upon the physical conditions which, in my opinion, have established the somewhat unexpected fact, that sheep will thrive in those intertropical lands, whose rich vegetation and considerable altitude above the sea necessarily produce a more moist and temperate climate than exists in sea-girt lands in the same latitude. In this case, as in former vague theories respecting Central Africa, experience alone dispels error, and teaches us the truth; and, just as the interior desert or supposed inland sea of Australia has vanished from our speculations before the data accumulated with great toil by our bold explorers, so the dogma that sheep and cattle could not thrive in large intertropical portions of this great Continent has, to a great extent, been set aside by the spirit and enterprise of our daring colonists.

In concluding this incomplete summary of some of the chief geographical operations in Australia since the foundation of our Society, I must here say that no one of our Associates at home has more sedulously noted each fresh addition to our knowledge, in excellent maps, than Mr. Arrowsmith, who, for such works and many other labours relating to these and other distant regions, of the highest value to all geographers, was justly honoured with one of our Medals.

With the progress of exploration, nearly two-thirds of Australia have now been either settled or partially explored, whilst the population, which, in the year 1830, amounted only to about 50,000, has risen to near a million and a half of inhabitants. With establishments at Cape York, Van Diemen's Gulf, and, I hope also soon to add, at the mouth of the Northern Victoria River, and, thanks to our admirable naval surveyors, with a secure passage laid down for all vessels navigating northwards within the barrier-reefs of the east coast, by Queensland to Torres Straits, this generation will not pass away before a brisk intercourse will be established between Australia and our East Indian possessions, China, and Japan.

I now see rapidly approaching, that consummation which some of my less sanguine friends looked upon as a dream, when, in a former Address,* I said, "I have little doubt that the time will soon come, when all minor difficulties will disappear before the energy of British colonists, in their endeavours to connect their Australian possessions with the rich marts of the Eastern hemisphere."

* Address, 1857.

*Asia.*—In so far as concerns Asia and its archipelagos, a vast improvement, both as to extent and accuracy of geographical knowledge, has taken place since the first formation of our Society, and we may take credit to ourselves for the degree in which we have contributed towards it. Exclusive of what has been put on record in our Proceedings, the volumes of our principal publication, the Journal, contain 34 memoirs on Hindustan and the countries adjacent to it north and west; 13 on the Hindu-Chinese countries, or the tropical region between the country of the Hindus and that of the Chinese; 12 on the Malayan Archipelago; and 11 on China.

At our Meetings, instructive discussions have followed the reading of these Papers, as well as of some contributions in our Proceedings, frequently in the presence of their authors, parties personally acquainted with their subjects taking a part in them. The greatest number of our recorded contributions regard India proper, in which, as our own, we have a deep and almost domestic interest when we consider that we have incurred the responsibility of governing a country fifteen times the extent of our own Islands, with fivefold the number of their inhabitants. Since the institution of this Society, our acquaintance with the countries adjacent to Hindustan, to the north and south, namely, the Himalayas, Nepaul, Thibet, Cashmere, Cabul, and even remote Bukhara, amounts to a geographical revolution. The names of a few of the more prominent labourers in this wide field may be mentioned, and among them will be found Fellows and Medallists of this Society. In the long list we find such names as those of Sir George Everest, Sir Andrew Waugh, the brothers Captain and Dr. Gerard, Colonel Richard and Major Henry Strachey; Colonel Strange, Colonel Thuilliers and Captain Montgomerie. The physical geography, botany, and natural history, including the phenomena of glaciers in this region, have been specially illustrated by the labours of such men as Dr. Joseph Hooker and Dr. Thomson, and, above all, of the late lamented Dr. Hugh Falconer, who have been followed quite recently by Captain Godwin-Austen.

With regard to the Hindu-Chinese countries, although our knowledge is still but imperfect, the progress of our acquaintance has yet been very remarkable. On the eastern shore of the Bay of Bengal we are in possession of a domain nearly equal in extent to Great Britain, which is under the enlightened administration of Colonel Phayre. This territory, with its sparse population of a million, and which was at one time deemed a worthless acquisition, has turned

out, in so far as foreign countries are concerned, the chief granary of India, furnishing ourselves with 3,000,000 cwts. of rice yearly, and supplying us, moreover, with all the teak-wood indispensable to the construction of our ironclad navy.

With respect to other Hindu-Chinese countries—Siam, Laos, Cambodia, and Anam, or Cochin-China and Tonquin—although great progress has been made, still much remains for exploration in a field which embraces not less than 15 degrees of latitude and 10 of longitude. The principal labourers in this quarter, and whose contributions are to be found in our records, are the late Sir Robert Schomburgk, the late M. Mouhot, and Dr. Bastian. In this direction we have reason to expect much geographical knowledge from the officials and colonists of the extensive conquest which the French have within the last few years made in Lower Cambodia.

But it is in the great and industrious empire of China, with its computed population of four hundred millions, that geographical discovery has been most conspicuous. When this Society was founded, our accurate knowledge of it was confined to a single river and port, and it now extends from the Gulf of Tonquin to that of Pechili. The Yang-tse, the greatest river of Asia, and for navigation second only to the Mississippi—superior even to it for irrigation—has been ascended for 1800 miles; while at the distance of 800 miles from its mouth a great and valuable commercial port has been established, with safe access to our numerous steamers. With this extended geographical knowledge our commerce has kept pace, the yearly value of our own trade with the Chinese empire being not less than 25,000,000*l.*, while that of our Indian empire and colonies is of at least equal amount. The extent of our connexion with China, and the progress which it has made since the formation of our Society, may be judged by the increase which has taken place in our consumption of the great Chinese staple, tea, which amounted annually, thirty-five years ago, to 30,0000,000 lbs., and last year to 92,000,000 lbs., or was, in other terms, more than trebled.

Amongst the most distinguished of those who by scientific surveys have contributed of late years to enlarge our geographical knowledge of China may be mentioned the names of Admiral Collinson, Captain Sherard Osborn, and our Medallist Major Blakiston, who extended our acquaintance with the great Yang-tze-Kiang to a distance of 1800 miles above its mouth; while the manners, customs, and statistics of China—no less a part of geography—have been illustrated by Fortune, Laurence Oliphant, and Michie.

In the Malayan Archipelago our political influence extends to but a small portion of its northern part, but in this geographical knowledge has been greatly improved. Among our countrymen, the principal contributors to it in this quarter who have followed our distinguished Vice-President Mr. John Crawfurd, have been Sir Edward Belcher, Sir James Brooke, Mr. Robert Logan, Mr. St. John, Mr. Windsor Earl, and Mr. Alfred Wallace. Through the labours of these zealous and intelligent inquirers, the Malay peninsula, the great island of Sumatra, and the huge one of Borneo, are far better known to us than they were to the founders of our Society. The value of our intercourse with these countries may be judged by the amount of the commerce we carry on at three small emporia, lying on the Straits which separate the southern peninsula of Asia from the island of Sumatra, and which last year amounted to 15,000,000*l.*

By far the greater portion of the Malay Archipelago, however, is either in possession of or subject to the influence and control of the Government of the Netherlands; and it is but bare justice to the Dutch to state that their active pursuit of geographical, geological, and other branches of scientific knowledge for the last fifty years has fully redeemed the short-comings of the preceding centuries.

Yet, with all these advances, much indeed remains to be accomplished, and to these and other desiderata I will advert in concluding this Address.

*Russia and her Boundaries.*—Among the great advances made by Russian geographers and travellers, I have adverted particularly in my previous Addresses, from as far back as the year 1857, to the researches of M. Radde in Eastern Siberia. I now learn from the Compte Rendu of the Imperial Geographical Society, prepared by its Secretary, M. Besobrasoff, that the second volume of the condensed work of M. Radde has appeared, in which the author describes in detail great part of the countries along the frontier between Eastern Siberia and China. Commencing with the eastern end of the Sayan Mountains, which, lying to the south-west of Irkutsk, constitute the separation between the two empires, M. Radde particularly dwells on the lofty, snow-capped, glacial mountain of Mungo Sardyk, surrounded by nomadic tribes, and rising to the height of 11,000 French feet above the sea. This grand mountain had never before been properly explored, having escaped the notice of both Humboldt and Ritter, though, as the culminating point of the Sayan chain, and lying immediately to the

north of the vast Chinese Lake of Kossogol, it is the key of the whole of that lofty region, and forms an admirable line of national demarcation. M. Radde indicates clearly all the routes through these mountains, by which the Chinese and Russians exchange commodities, the latter passing from the frontier-post of Changuinsk. The people living on the south side, who keep up the trade, are the Darkhates and the Urianks, tributaries to China, and probably unknown to all Englishmen. They inhabit the sides of the vast Lake of Kossogol, which extends from the Sayan chain on the north to nearly due south, for a distance of 200 miles. These people, who are Buddhists, and live on the plateau of Kossogol, at 5600 feet above the level of the sea, are entirely distinct in manners, habits, language, and religion from the Russians of Eastern Siberia. They are in fact of the same race of great herdsmen and horsemen as those of the vast regions of Mongolia, so well described by our deceased associate the traveller Atkinson.*

It appears, from what M. Radde has already written (his third volume will only be completed this year), that he embraces every Natural History subject, besides the sciences of Geography and Ethnology; and it is earnestly to be hoped that this admirable work may be translated into English or French; for, already, Dr. Petermann, in his 'Mittheilungen,' has given us a foretaste of much that we may expect from this rich source of fresh knowledge.

And here, in reference to the boundary between Russia and China in the environs of Kossogol, it is well to be reminded that a hundred years ago the Urianks of the Lake Kossogol were not (as they are now) tributary to China, and that at that time the Russians had an "ostrog," or advanced post, considerably beyond their present frontier. At present, an intermediate space, occupied by nomades, intervenes between the Russian posts on the north and the Chinese on the south.

Whilst on this topic of Russian frontiers, I must be allowed to direct your attention to a partial change recently made along the Russian frontier, between their former line and the Khanat of Khokand, inasmuch as I am desirous of showing that the alarm taken by a few of our countrymen only, particularly those who conduct the press in India, in relation to this step, is entirely groundless. A simple statement of the facts, and of the great distance which separates any portion of the new Russian boundary line from the

* It is here to be noted, that if any member of our Alpine Club should wish to explore the glacier of Mungo Saidyk, he should know that the mountain can only be ascended from the southern, or Chinese side.

nearest part of British India, or rather from Cashmere our tributary ought to calm these untoward forebodings.

Let it be borne in mind that, long before England had any establishments in the East Indies, the Russian Czars traded with China and the great Khanats of Bukhara and Samarkand. Caravans have been passing from time immemorial through the nomade Kirghis tribes, which have long been subordinate to Russia. Of late years, however, this intercourse has been much interfered with by parties of warlike and plundering Khokandians, who, passing from the mountains, pillaged caravans, as well as the Kirghis people, along that portion of the Russian frontier which lies between Fort Perovski on the River Syr Daria (anciently Jaxartes) and the great Lake Issikul, which extends to the Chinese frontier. Resolving to punish these atrocities, the Governor of Orenburg caused the frontier of the Cossack stations to be advanced from the sterile tract where the troops could not be maintained, to a more fertile tract, including the town of Tchemkend, which was conquered, and where corn and grass are in sufficient abundance to sustain a new line of Cossack posts between their post of Fort Perovski on the Syr Daria and the Lake of Issyk-Kul. This act is similar to the proceedings of our own Indian Governments, past and present, in reference to any lawless pillagers on our own frontier; but respecting it there have been great exaggerations. The new Russian boundary, after crossing the River Ili, runs in a southerly direction towards the source of that stream, locally called Tekes, and thence along the ridge of the lofty Thian Chan mountains. But whilst the Russians have no forts along this advanced line, the Black Kirghis, who inhabit the tract, have definitively recognised the rule of Russia.*

That which I particularly wish to eradicate from the minds of my countrymen, who only look at maps of Asia on the scale of perhaps 100 miles to an inch, is the absurd idea that, operating from this, the most barren, thinly-peopled, and most remote portion of all his vast empire, the Emperor of Russia has really any design upon British India!

Even were it possible, which from my acquaintance with the

* The above account of the exact line of the Russian boundary in this part of Central Asia is derived from M. Semenoff, of St. Petersburg, who, having explored this very country, is now bringing out a map of it. This description, which I owe to the obliging inquiry of Mr. Thomas Michell of the British Embassy in Russia, differs in some respects from that which was printed in the private copies of my Address, derived from a less accurate map. The new line is correctly given in the map of the instructive work entitled 'The Russians in Central Asia,' translated by the brothers J. and R. Michell.

steppes of the Kirghis I utterly deny, to move a large organised army across the deserts of the Oxus, to those portions of China with which the Russian people have long traded, it may be positively asserted that the invasion of British India, from any portion of this new Russian line to Western China, occupied by a few Cossack posts only, is a pure chimera, if not a physical impossibility. Not only is every part of the new Russian frontier separated from the nearest point of our tributary Cashmere by a space of at least 500 miles in breadth, but in that space there occur lofty, ice-clad, impassable mountains, the Thian Chan of Humboldt, which, ranging into the Mustagh and Karakoram chains, constitute the western limbs of the mighty Himalayas. Never, therefore, was there so purely baseless and visionary an apprehension of a Russian invasion of India, as this which has been raised simply upon the taking up of a partially new line of frontier, which our allies, in protecting their own tributaries, had a perfect right to establish in order to keep up their ancient communication with China, in the western extremity of which, at Kashgar, the site of Adolph Schlagintweit's murder, they have been allowed by the treaty of Pekin to establish a Consul.

After this digression, which I have made in the sincere desire to aid in thoroughly re-establishing the kindly relations which happily existed for centuries between Russia and England, and of which I have experienced in my own person so many proofs, I revert to pure Geography.

Let me then inform you that, besides the admirable work of M. Radde, the Geographical Society of St. Petersburg has announced the publication of a petrographical map of the arrondissement of Minougsinsk, by Professor Grewinck of Dorpat, a map of the southern part of Eastern Siberia, and the Chinese boundary in those meridians, embracing the whole riverine system of the Amur and its tributaries, the southern half of the basins of the great streams, the Lena and the Yeneissei, and also of the large island of Sakhaline, on the small and general scale of 40 versts to the inch. Besides this, there is a smaller map of the same regions, on the scale of 160 versts to an inch. Again, the historical sketch (in German) of the great Siberian expedition by M. Schmidt, of whose important geological and botanical contributions I have formerly spoken, will soon be illustrated by a geological map of the southern portion of Eastern Siberia, another map of the basins of the rivers Amur and Bureia, and a third of the island of Sak-

haline, the physico-geographical description of which is supplied by M. Glehne.

When we look back to the condition of the geography of Russia in the year 1840, when I first visited that country, and consider its present advanced state, we may truly say, that the strides made in the quarter of a century which has elapsed are most surprising. At that time there was not even a reliable map of Russia in Europe; and though there were in the War-Office military sketch-maps of the distant frontiers, how different were these from the exact maps and descriptions which have been since obtained and worked out by the labours of a Geographical Society founded on the model of our own! At that time no railroad had been commenced, and now such lines of communication are in the course of extension over wide tracts of European Russia. Nay, more, the electric telegraph is about to be carried on the one hand across Eastern Siberia and Mongolia to Pekin, and on the other from the mouth of the great River Amur northwards along the shore of the Sea of Okutsk, passing by Kamschatka to Behring Straits, across which there will be no difficulty in establishing a submarine cable. Thence, traversing Russian North America and running along the shores of British Columbia, this gigantic line will terminate in California and the United States.

It remains to be proved whether the inhospitable and intensely cold regions through which the last-mentioned electric wire is to be carried, may not oppose serious obstacles to the establishment of such a line of telegraphy; but, if not, the submarine distance to be traversed is so short that it is probable the communication with America may be more rapidly made by land, notwithstanding the great distance, than by crossing directly under the wide Atlantic, should the great submarine Atlantic cable be, as we all hope, successfully laid.

In relation to another frontier country of Russia, a stop had been put to the regular intercourse between her main dominions and Georgia by the fall of an enormous mass of broken rocks and ice, proceeding from the glacier of Devdorak, which lies along the flank of the lofty Kasbeck Mountain high above the valley of the Terek. It is by this defile that the only great military road passes, and at previous periods similar *éboulemens* have occurred in this locality. It is estimated that the present fallen mass of broken materials has a bulk of nine millions of cubic feet; and by it the course of the river Terek has been dried up even to Vladikau-

kase, for a distance of forty versts. As it will take two years to melt the fallen blocks of ice, and to remove the stones which encumber the great road, traffic is now with difficulty carried on by paths on the side of the huge broken mass. It appears that between 1780 and 1830 there occurred six of these *ebouleмens* at intervals of six to fifteen years, and that the last occurred in 1853.

This phenomenon is well worthy of the consideration of those who study the operations of glaciers, on which I dwelt at some length in my last year's Address. For, it is essential to distinguish between an occasional downfall like this, which in a single day blocks up a whole valley with ice and stones, and the regular, silent, and slow advance of the moraine of a glacier. And yet the mass of débris of the one and the other may so resemble each other that, if the Caucasus were an unexplored region, the traveller who first passed by this valley of the Terek in a season after the fallen ice had melted, leaving the loose stones only, and saw the distant glacier of Devdorak far above him on his flank, might naturally have taken the huge piles of broken rocks around him for the moraine of a former period, produced by an old gigantic glacier that had since retreated to the Kasbeck Mountain.

I earnestly trust that some geologist will visit this gorge and report upon the phenomenon; it being of deep interest to ascertain if striations and groovings, similar to those produced by the slow advance of a glacier-moraine, have been imprinted on the surface of the rocks over which this portentous mass of broken ice and stones has so suddenly been hurled.

Even when concluding this Address, I have received another portion of the Compte Rendu of the Imperial Geographical Society, accompanied by a letter from its present accomplished Secretary, M. Osten Sacken, who has succeeded M. Besobrasoff. Ample details, he writes to me, have been given of an expedition which took place last summer, by which the River Sungari, a vast affluent of the mightier Amur, was ascended in a steamer by the astronomer Ussoltze, the interpreter Schichmare, and Prince Krapotkine. They ascended the river for twenty-one days, and having reached the city of Ghirin, in the heart of Mandchuria, spent twelve days in returning to the Amur. Ghirin, marked on most maps as Girin-Oola, is surrounded by a most fertile country, producing wheat, millet, maize, apples, peaches, and grapes, and is about 1056 versts above the mouth of the Sungari. Most of the intervening space is a country deprived of wood, and in which the inhabitants use

only reeds and small shrubs as firewood, though, at about 700 versts from its mouth, the river flows through mountains which are richly wooded. Along the lower part of the stream the population is comparatively insignificant, with the exception of a town of considerable barter and commerce, called San-Sing. The navigation of this noble stream presents no obstacles, and the inhabitants on its borders carry on a brisk commerce, and were very friendly to the travellers. Above Petunhootan, the passage of vessels to Ghirin can only be effected during seasons of floods. I quote this as one of the most interesting and important among the numerous explorations of the Imperial Geographers, as it opens out a country scarcely before visited except by a few French Jesuit missionaries, and must afford a fine field for the commercial enterprise of the inhabitants of Eastern Siberia.

The numerous important changes which have been made in the position of places and the contour of the vast countries of Eastern Siberia, and all that portion of Asiatic Russia which borders Mongolia and China, will soon appear in a general map, the numerous and laborious researches on which it is founded being mentioned in the Compte Rendu of the Imperial Geographical Society. Other highly important works in the great province of the Caucasus, and the results of surveys around and soundings in the Caspian Sea are also enumerated.

*South America.*—Great advances have been made towards a correct geographical knowledge of South America since the labours of the Society commenced (1830). At that time the coasts were inaccurately laid down, the courses of some great rivers, notably the Beni, were merely guessed at on existing maps, and those of others, besides vast tracts of country, were entirely unvisited. Much has since been effected through the labours of Fellows of this Society and other explorers, yet very much remains to be done.

The admirable surveys of King and FitzRoy, carried out chiefly by the last-named, were commenced in 1826, and during ten years of arduous and zealous work the coast of South America, from the River Plate to the Guayaquil River, was accurately laid down, including the Straits of Magellan and the intricate channels and archipelagos to the westward. This work was most truly described by the late Mr. W. R. Hamilton (then President of this Society, in his annual Address of 1839,) as without parallel in the annals of maritime surveying, and as one which thenceforth would inseparably connect

the names of Humboldt and FitzRoy as the chief authorities on the geography of South America. The Sailing Directions of the lamented Admiral FitzRoy are still, indeed, the sole guide for the navigation of those coasts. That able and high-minded officer who, as I have before said, spent a large sum out of his private fortune (for which he was never remunerated) in completing the survey, also fixed the height of Aconcagua, one of the principal peaks of the Andes. And here I must remind you of what I have already said in the Obituary regarding the light which was thrown upon Physical Geography, Natural History, and Geology, by the companion of FitzRoy, our eminent Associate Charles Darwin, whose works, mainly founded on observations in South America, form quite an epoch in the literature of scientific travel.

When the Society was formed, Sir Woodbine Parish and Mr. Pentland were already at work in South America. To the former we are indebted for many valuable communications, and there are few who have worked so zealously in collecting geographical information for the use of his countrymen. On his return to England he joined our Society with a vast mass of geographical materials, collected during a long residence in the La Plata provinces, to which he had been sent originally by Mr. Canning to obtain information for the guidance of our Government. Let me also say that of the many Associates I have met with at different periods in our Council, no one contributed more assiduously and successfully to the rise and progress of the Society than Sir Woodbine Parish. In the same Address of Mr. Hamilton, mentioned above, you will find a very full enumeration of the authorities for the maps of South America which Mr. Arrowsmith then undertook to construct for the account of the voyage of the *Beagle* and for Sir Woodbine Parish's own work, published about the same time. Mr. Pentland, who was also sent out by the same enlightened minister, Canning, surveyed the shores of Lake Titicaca, fixed the positions of forty stations astronomically between that interesting point and Cuzco, and contributed to our Journal a most valuable paper on the Bolivian Andes.

The attention of our Society was very early turned to South American discovery, and one of our first acts was to grant a sum of 900*l.* for the exploration of the interior of British Guiana, by Sir Robert Schomburgk. The valuable labours of that indefatigable traveller extended over a period of more than eight years, commencing from 1835. He ascended the Rivers Corentyn, Berbice,

and Essequibo to their sources, explored the interior chains of mountains in Guiana, and struck across to the Orinoco, thus connecting his positions with those of Humboldt. That great traveller was stopped at San Carlos on the Rio Negro, but Schomburgk descended the mighty affluent of the Amazon to its junction with the Rio Branco, and returned to Guiana by ascending the latter stream. During this remarkable journey he made a survey of an extensive and previously unknown region.

When Schomburgk was commencing his discoveries in Guiana, Smyth, in 1835, started from the Andes, explored part of the courses of the Rivers Huallaga and Ucayali, crossed the Pampa del Sacramento, and was the second English geographer who descended the mighty Amazon. He fixed several positions astronomically, and made valuable contributions towards a more correct knowledge of the course of that queen of rivers. In this field of research he has had several worthy successors. Wallace explored the course of the Rio Negro and the previously unknown Uaupés; Spruce surveyed the Trombetas and two tributaries of the Cassiquiare, and ascended the almost unknown Bombonaza; and Bates devoted several years to an examination of the main stream of the Amazon as far as St. Paulo, near the frontier of Peru. These observant and intrepid explorers have contributed most important additions to our still very imperfect knowledge of the grandest river-system in the world.

Meanwhile a vast region was virtually unknown on the eastern slopes of the Andes, and indeed on the plateaux themselves, and much still remains to be explored. But slight progress has been made by geographers in this direction. That gallant soldier and enlightened statesman, General Miller, explored a tract of country to the eastward of Cuzco in 1835, into which no Spaniard had ever penetrated. Markham, in 1853, followed in his footsteps, and traced the courses of some additional sources of the Purus, a great affluent of the Amazon; and in 1860 he explored the unknown southern part of the Peruvian province of Caravaya. In 1853 Colonel Lloyd traced the course of the River Chimore, a tributary of the Madeira; and Dr. Jameson, of Quito, in 1861, descended the River Napo. Of late years Mr. David Forbes, the brother of the eminent naturalist, Edward Forbes, and himself a skilful mineralogist, has done valuable work in the Bolivian Andes, particularly in rectifying certain errata of the late M. D'Orbigny in the general classification of the rock formation extending from Peru to Chili, and in showing that the highest mountains in the chain were composed of slaty

Silurian rocks. Recently he has also penetrated for some distance into the little-known region solely occupied by Indians to the east of the Bolivian Andes.

In the Argentine Republic, and in Chile, English travellers have laboured with some effect in the wide and interesting field first opened out by Sir Woodbine Parish. The undertakings of that untiring and liberal explorer, Mr. Wheelwright, and his surveys of passes in the Chilian Andes, have been as welcome to geography as to commercial enterprise. Mr. Mansfield's charming account of the Gran Chacu drew attention to another region as yet inadequately explored; while the scientific labours of Captain Sulivan, and the journeys of Mr. Hinchcliffe, Consul Hutchinson, and Mr. Hadfield (now the editor of the 'Brazil and River Plate Mail,' a journal which diffuses much new geographical information), have increased our knowledge of the River Plate and its affluents. The latest researches of Hutchinson have been in the valley of the Salado, an important branch of the Paraná, in which he has been aided by the enterprising engineer, Mr. Coghlan, one of our Fellows. One of our Foreign Honorary Members, Professor Burmeister, of Buenos Ayres, has added much also to our knowledge of the interior of the Argentine Republic, both in his Book of Travels through the La Plata States, and his improved map of the same region. Whilst I am engaged in writing this Address, Captain Parish, R.N., the son of Sir Woodbine, who has just returned to England, after a journey of 1000 miles up the Paraguay, has brought a copy of a new edition of this map for presentation to our Society, on which are numerous manuscript notes, containing the latest information regarding the interior of this great region. For an account of the researches of M. de Moussy and of M. Demersay's important works on these same countries, I must refer you to my Address of 1861.

On the west coast of South America Admiral Kellett continued the survey from the Guayaquil River to Panamá; and one or two portions of the Peruvian coast have been explored by English geographers. Thus Markham has examined and described the valleys and deserts from Lima to Nasca; Spruce has given a most complete and valuable account of the valleys of Piura and Amotape; and Bollaert has collected much geographical information respecting the province of Tarapaca and its inexhaustible mineral wealth.

In this hasty sketch it has merely been my intention to point out the labours of English explorers in South America since the foundation of the Royal Geographical Society; but it would not be right

to omit the equally valuable results of the travels of Frenchmen, Italians, Germans, and Americans; while the praiseworthy exertions of native geographers call for special notice. Martius, Poeppig and Tardy de Montravel on the Amazon; Castelnau in Brazil, Peru, and on the Ucayali; the officers of the great French Survey of the coast of Brazil; Herndon and Gibbon on the Amazon; Gay, Gilliss, Domeyko, Plessis, Allan Campbell, Moesta, and Cox, in Chile; D'Orbigny in Bolivia; Codazzi in Venezuela and New Granada; Von Tschudi in Peru; and Page, and De Moussy, in the Argentine Republic, have, by their indefatigable explorations, added most important material to our knowledge of South American geography.

But the natives of South America themselves have not been idle, and, considering the great difficulties they have had to contend against, the sons of those interesting and still struggling young Republics have done good service to our science. In New Granada the learned Colonel Acosta, by the construction of a valuable map, has followed worthily in the footsteps of his great countryman Caldas. I also learn from himself that General Mosquera, who has twice served as President of the United States of Columbia, and who is now the representative of those States at the British Court, is engaged with others in bringing out a great work on the geography, history, and statistics of his native country, formerly New Granada. In Ecuador the work and map of Villavicencio show that the sons of the Equator are not neglecting geography. In Peru the explorations of Raimondi and the work and map of Paz Soldan form valuable contributions to our knowledge of that country. In Bolivia a complete map of the republic has been constructed by Ondarza. The Chilian Government has initiated several exploring expeditions, and our Foreign Corresponding Member, Professor Philippi, has examined the desert of Atacama under its auspices. In the empire of Brazil surveys have been conducted under the enlightened patronage and superintendence of the present Emperor, who has graciously accepted the post of one of our Honorary Members. Several South American geographers are now Corresponding Members of the Society, and we may confidently look forward to active co-operation from them in increasing our geographical knowledge of that great continent in future years.

*Africa.*—Any recapitulation, however brief, of all the researches made upon this great Continent, since the foundation of the Geographical Society, would swell this Address to an inordinate length;

for, in every one of the thirty-four volumes of our Journal, there are memoirs upon parts of Africa. Having in the last year's Address endeavoured to comment upon the last advances which had been made, I have on this occasion but few observations to offer upon the achievements of the past year. In truth, whilst Baker is in the heart of the country, von der Decken just starting from Zanzibar upon his self-imposed and costly endeavour to penetrate into the interior by ascending the Jub, or some adjacent river, and Du Chaillu advancing on the same parallel from the west, our great explorer Livingstone is still among us, preparing for a new and most extensive journey in Eastern Africa. I have, therefore, to dwell only upon my hopes and aspirations.

At the last Anniversary I informed you that the Council had drawn up a memorandum, in which, after enumerating the desiderata of such an expedition, a hearty willingness was expressed to embark 1000*l.* in aiding such an examination of the White Nile as would lead to a commercial intercourse between Egypt and the countries of the Equatorial kings visited by Speke and Grant. Such an expedition would, it was conceived, tend also to put an end to much lawless and cruel conduct of slave-traders on the banks of the great stream. Thus every Geographer desired to see this vast river, which, for a distance of 1600 miles above the cataracts, has now, thanks to the Dutch ladies and Miss Tinné, been proved to be open to steam-navigation, rendered available in the improvement of the people, and the advancement of civilisation and commerce. Alas! I regret to say that this scheme, cherished by merchants and philanthropists, as well as by geographers, does not at present seem likely to succeed, owing chiefly to political causes. Though postponed, let us, however, hope that the day is not very distant when the White Nile will, with the capabilities of which we have now become acquainted for the first time in all history, be rendered of real use to commerce and civilisation: and, at all events, let it be on record that this Society made the first move in so righteous a cause.

But, if this project be suspended, there is another about to be carried out, which as regards Geography is of still higher importance, and must also be of great value to the natives of Eastern Africa. After all that has been accomplished by Burton, Speke, and Grant, and with the additions to our knowledge now being made by Baker, Von der Decken, and Du Chaillu, we may hope that, in the wide tracts around and north of the Equator, the water-system of Africa

will ere long be much better known. As, however, the very large region lying between the southern extremity of the Tanganyika of Burton and Speke, and the northern end of the Nyassa of Livingstone, has never been traversed by any European, and has only been imperfectly described by natives, the Council of our Society has rejoiced in engaging Dr. Livingstone once more to revisit South-eastern Africa, and determine the hidden watershed of that vast country.

Refreshed and invigorated by his home-visit, during which he has prepared and is about to publish an admirable sketch of his last adventures, to which I will afterwards allude, my eminent friend at once accepted our invitation; and, on an application being made, Earl Russell, in supporting this geographical effort, has, happily, connected it with the public interests, by appointing Dr. Livingstone to be H.M. Consul in the interior of Africa; for as such he is accredited to all the chiefs and rulers, with the exception of those countries which are subject to the King of Portugal, the King of Abyssinia, and the Pasha of Egypt. Whilst the Government and the Geographical Society unite in aiding this expedition, it is not to be passed over without the expression of our gratitude, that Mr. Young, one of Livingstone's old friends, should have advanced 1000*l.* in furtherance of this great cause. Nor are we to forget that Livingstone himself is about to throw into the adventure the steamboat the *Lady Nyassa*, which he left at Bombay, and which, with a noble resolution to check the slave-trade, he built at his own expense, because the steamer sent out by the Government drew too much water for the navigation of the Shiré; by which alone he hoped the transport of slaves from the interior might be prevented. Whether, after proceeding *viâ* Bombay to Zanzibar, he will penetrate the continent by ascending the Rovuma, as he has already done, or at some point northward of it; either route being entirely to the north of the Portuguese boundary, there can be little doubt that he will solve the problem of the true course of the waters between his own Nyassa and the Tanganyika of Burton and Speke. And if, on reaching the latter inland sea, he should, after accurately fixing its altitude, ascertain whether any great river flows from it to the west,—and still more if he can further determine the disputed question of whether any waters do or do not escape from its north end to feed the White Nile,—he will have so added to his grand previous labours as to have won a first place among the African travellers of this age and of all former periods.

Whilst von der Decken is entering East Africa just south of the Equator, Du Chaillu has boldly started on the same parallel to reach the interior from his old station on the River Fernand Vaz, south of Cape Lopez. The self-reliance and courage of this explorer cannot be too much admired, for he is now travelling quite alone, and assisted only by a few natives from the coast, who are to continue with him. He is wending his way without a single friend or European companion, and trusting for the transport of his large stock of goods, provisions, medicines, together with philosophical and photographic instruments, to the various tribes he may meet with. Knowing, as I do, that these preparations have been accomplished by spending all the little fortune acquired by the sale of his first book, I cannot sufficiently admire the energy of my absent friend, and his entire devotion to the cause of African travel. In his last letter to me, written on the point of departure from the coast, he begged me not to be uneasy about him for a year or two: for, whether he may or may not discover the sources or upper affluents of any of the west-flowing streams, he is imbued with the idea that from the same region some great affluents of the Nile, such as the Luta Nzige, may also flow, and, if so, he hopes to descend their streams, and reappear in the civilised world by reaching and passing down the Nile itself. Let me here say that nothing can better testify to the honest ambition of Du Chaillu to be serviceable to every branch of Science, than that, during his stay at Fernand Vaz, where he was detained till he could receive a renewed supply of those instruments which were lost when he disembarked, he has contrived to send home to the British Museum a vast number of well-selected objects of Natural History, which, on the authority of Professor Owen and Mr. J. E. Gray, I have to announce are of the highest value. As M. Du Chaillu has rendered himself a photographer, as well as an astronomical observer—advantages he did not possess in his first journey—we are sure, if his life be spared, to reap a rich harvest on his return; and so let us wish him God-speed by the way! In boldness of conception nothing in the annals of African research has surpassed his present project.

Turning from the Southern and Equatorial countries to North Africa, we have had great satisfaction in witnessing how much original work has been accomplished by the travels of Gerhard Rohlfs, a native of Bremen, towards the expenses of whose journey our Society contributed 50*l*. At very small cost, and in a comparatively brief period, this zealous young German has penetrated the

interior of Africa from the side of Marocco as far as the oasis of Tuat, and thence crossing the Great Atlas, reached Tripoli by way of Ghadames. He has now, after a brief visit to his native land, and consigning his journals to Dr. Petermann, to be published in the 'Geographische Mittheilungen,' again proceeded to Tripoli, with a view to another journey across the Sahara, during which he hopes to penetrate as far as Timbuctu.

*New Publications.*—Having been unable, owing to many duties, to read and digest the contents of various works bearing upon geographical science which have appeared during the last year, I will now only refer to four publications, which have deeply interested me. The first of these works, in reference to date, is that of the ardent and observant Hungarian traveller, M. Vámbéry, who, at our last meeting of the past summer, gave us the first sketch of his travels through Central Asia, in the character of a Mahomedan Dervish. No person, who was then present, can forget the effect he produced upon us when he related his racy and lively story, and explained to us the obstacles he had to overcome in traversing the Khannats of Khiva and Bukhara to Samarkand.* Sir Henry Rawlinson, who has so intimate an acquaintance with Asiatics, when speaking in praise of these adventures of Vámbéry, justly told you† that there was not one European in a thousand (I would almost say in ten thousand) who could successfully pass as a holy man through three years of probation among bigoted Mahomedans. The materials he had collected, and which were then only briefly alluded to, have since been formed into a highly interesting and attractive volume; and I earnestly hope for the honour of my countrymen that this work will have a much larger sale than it has yet met with. We must ever recollect that M. Vámbéry went through the appalling difficulties and dangers, which beset his toilsome path, from a pure love of the science of language, and in the hope of tracing the root of his native Magyar tongue. Since he came among us he has so endeared himself to us by his agreeable conversation, and has so charmed many a society with his

* At that meeting justice was not done to the Description of Samarkand made by the Russian Expedition, consisting of MM. Khanikof, Lehmann, and some officers of the Imperial School of Mines, who went thither in 1841, at the invitation of the Khan, to search for valuable mines and ores. This work was translated into English by Baron de Bode, and is in the British Museum. All this was explained at the Bath Meeting of the British Association, at which I stated that I was myself at Orenburg in 1841, when this Expedition went to Bukhara and Samarkand.

† Proceedings, Vol. viii. No. 6.

sparkling anecdotes, that we are no longer surprised that he could pass unscathed through the deserts of the Oxus, or obtain the marked notice of a great Khan amid the palaces of Samarkand. Justly, therefore, has the Council acted in awarding a recompense to this bold traveller, who, as I have already said, might have obtained a Gold Medal at my hands, if, as a holy Dervish, he had not been interdicted from practising what would be considered the "black art" among Mahomedans—the taking of any of those observations which Geographers require.

The 'Travels and Researches in the Island of Crete,' by Captain T. A. B. Spratt, R.N., is a work which will rivet the attention and enrich the minds of various readers, whether they be antiquaries and scholars, or geographers and men of other sciences. Well may I have spoken elsewhere in this Address, of that highly-instructed branch of the Royal Navy, the Surveyors; for here we see produced by one of them a masterly illustration of the physical geography, geology, archæology, natural history, and scenery of the diversified island of Crete. In his accurate nautical chart, giving the outlines of the land, and the soundings around this broken and deeply-indented island, as seen in the geological maps published in these volumes, the author clearly sustains, by data exposed along the shores of Crete, the law laid down by De Saussure on the southern side of the maritime Alps, that the highest and steepest parts of a coast are always flanked by the deepest waters. Detailing the geological structure of the island, from the older rocks which rise to the summit of Mount Ida to the most recent deposits on the sea shore, Captain Spratt adduces physical evidences to prove that considerable elevations of the island, as seen in many places, have taken place within the historic period. This is demonstrated by the marks of the old sea-level, made when the sea covered the ancient port of Phalasarna, which has been raised up and constitutes dry land. In this way the importance of geological knowledge to guide archæologists is demonstrated: for our associate explains to us the changed form and outlines of old ports and cities, in a way which his predecessors, however learned, could not have applied, for want of geological knowledge. This work must indeed be warmly welcomed by all comparative geographers; and if that great scholar, our deceased associate Leake, were still among us, he would be the first to eulogise it.

When we consider the severe nautical duties which have been performed by Captain Spratt, and know that he is the officer, who,

called away from peaceful, scientific efforts, so distinguished himself afterwards in the late war, by boldly and accurately determining the soundings along the coasts of the Crimea, and under the enemy's batteries at Kinburn, thus leading in our fleet to act with effect, we cannot too much admire the many fine qualities which are combined in this gallant seaman. Let me say, as a geologist, that no portion of these most interesting volumes has more sincerely gratified me, than the manner in which the author enunciates and identifies himself with the views and observations of that profound naturalist Edward Forbes, who was for some time his companion. We must never forget, that, without the deep-sea soundings and dredgings conducted by Captain Spratt, we should never have obtained the grand views of Edward Forbes on the submarine zones inhabited by different classes of animals, which established an entirely new phase in the inductive reasoning of geologists, who, after all, are but physical geographers * of former conditions of the earth's surface.

Another work to which I specially invite your attention (and I have already alluded to it in my observations upon Africa), is one about to be issued by Dr. Livingstone, under the title of 'The Zambesi and its Tributaries,' and to the pages of which I have had access. Suppressing as much as possible the details of travel, and condensing into a single volume a narrative of his labours since we wished him God speed at our great festival in 1858, and of his method of overcoming the many difficulties he had to encounter, he indicates how, by ascending the Shiré, that great affluent of the Zambesi, he made, what I have no hesitation in saying, was the greatest and most praiseworthy effort ever attempted to stop the slave-trade in the interior of Africa. Thus, the great and important fact which is recorded in this book is, that the author was the first person who really tracked the slave-trade of Eastern Africa to its central source. He next successfully showed that as his own great Lake Nyassa, and its affluent the Shiré, have for 400 miles in the interior, a direction from north to south, or parallel to the coast, so a small steamer, being established on these inland waters, might effectually protect all the central and western regions from the devastation and cruel forays of the Arab traders, to which they are now exposed. Then, how can we too much commend the warm-hearted and zealous Consul, who, finding that a smaller

* See my Address of last year, Journal, Vol. xxxiii., in which Captain Spratt's Mediterranean Surveys are specially alluded to.

steamer than the Government had provided him with could alone effect this great good, ordered, at his own expense, the *Lady Nyassa* to be constructed. I have dwelt before now with deep interest on the unceasing efforts he made to have this vessel transported over the long Murchison Cataracts, extending northwards from the Zambesi: and assuredly if the territory had been adjacent to one of our colonies, or subject to British influence, the original scheme of my eminent friend, of nipping the slave-trade in the bud, would have been completely successful.

In this volume, besides narrating the political obstacles opposed to his efforts, Livingstone describes the capacity for transport in the Zambesi,* Shiré, and Rovuma rivers, the capabilities of the soil, the nature of the climate, with graphic sketches of the habits of the people over wide and varied tracts. When it is stated, that the volume also embraces clear and well-penned descriptions by his brother, Charles Livingstone, and contains some of the observations made by the accomplished naturalist of the expedition, Dr. Kirk, besides numerous geological and geographical data accumulated on the banks of the Zambesi by the lamented young Richard Thornton, enough is said to ensure for the work a welcome and grateful reception by the public.

A very original work, and, what is uncommon in such subjects, a very lively and attractive one, has just appeared under the striking title of 'Frost and Fire;'† which under the first of these names affords, by numerous illustrations, a strong support to my own glacial creed.

Nearly thirty years have elapsed since I expressed my belief as a geologist, that large portions of Britain were under the sea during a former glacial period when great icebergs, moved by dominant Arctic currents, carried great blocks and the Northern drift, lodging them at different altitudes on the sea-bottom of a sea, one portion of which flowed through the ancient channel to which I gave the prehistoric name of the Straits of Malvern.‡ I also then believed that, exclusive of the countries in which it could be shown that land-glaciers had existed or now exist, and where unquestionably they had produced, and are producing, striæ upon the surface of the rocks

* A good idea of the grandeur of the Zambesi scenery and the Great Victoria Falls, may be obtained by inspecting a model of the Falls and their neighbourhood, now at the Rooms of the Society, constructed by Mr. Thomas Baines, formerly Artist to the Livingstone Expedition.

† By Mr. John F. Campbell of Islay.

‡ See the 'Silurian System,' written in 1836, and published in 1838, p. 522.

over which those bodies of ice descend, similar markings and polishings must have been produced on a still wider and more extensive scale when huge icebergs, floating away from terrestrial glaciers to great distances, were arrested as they passed over lands which were submarine, and grated along the then bottom of the ocean. This view was subsequently extended in some detail by observations which I made in Scandinavia, Russia, and Northern Germany,* and in last year's Address I endeavoured to prove that, as regards the striation and polishing of rock surfaces and the translation of large erratic blocks, precisely similar effects had resulted from the marine transport of ice, as by terrestrial glaciers.

But to return to 'Frost and Fire.' Passing by the author's graphic descriptions by pen and pencil of the different effects produced in juxta-position in Iceland, where the accretions to the surface by volcanic action and the power of repressed steam in upheaving the land are in such fine contrast to the effects of denudation, I will now advert only to the icy branch of the great subject handled by Mr. John Campbell.

The main points of the glacial theory which he puts forward are shortly these.—As the Arctic current now flows from north-east to south-west, for reasons which he illustrates by various ingenious diagrams and contrivances, and as it now passes from Spitzbergen to Cape Farewell, and thence along the coasts of Labrador and Newfoundland, into the Atlantic, carrying heavy icebergs to lat. 36° 10′ and scraping rocks with them while lifting and dropping stones by the advance of coast-ice, so, as he argues, former Arctic currents bearing heavy ice-floats must have flowed from north-east to south-west, ever since the general climate of the world and distribution of sea near the poles were in anything like their present conditions.

As a glacial period now exists in Greenland, so a glacial period, he thinks, existed in Scandinavia and in Britain, when portions only of those lands were above water, and while the sea was open to an Arctic current. He tries to prove that such Arctic current laden with ice flowed over Lapland, down the Baltic, and over the British Isles † at a comparatively late period; and he argues that the glacial period in Britain probably ended when certain lands had so risen as to turn the cold stream with its climate westward, and so transfer

* See 'Russia in Europe and the Ural Mountains,' vol. i. pp. 507-557.

† If the author had read 'Russia and the Ural Mountains,' he would not have failed to recognise how my colleagues and myself had shown that the northern glacial drift covered all Northern Russia in Europe and Northern Germany.

the glacial period of Scandinavia to Greenland. He endeavours to show in detail that striæ better preserved than many sculptures of the historic period, exist on the tops of isolated hills 2000 feet high, in Connemara, Ireland, and on watersheds and passes in Wales, Scotland, Scandinavia, Lapland, and in America, and that these high marks have directions which support his theory. He has taken rubbings from these rocks, one of which is given on the binding of his book. The author imagines that water would move as air moves, and for the same reasons; and that denudation by ocean-currents ought to give a definite pattern, carved by these tools on rocks. Trees bent by prevailing winds have similar bearings in wide districts on both sides of the Atlantic; and so have many large systems of mountains and hollows which are attributed to denudation. He thinks that ocean-currents and climates similar to those which now exist, but differing in position, are sufficient to account for some ice-marks which no ordinary glacier could possibly have made, namely, striæ running horizontally along hill-sides, and over high points, as they do in Ireland and elsewhere. At the same time, he is fully acquainted with the effects of the action of glaciers on rocks, and illustrates his views by characteristic sketches: whilst, in citing numerous data in support of his view, he denies that existing rivers have *produced* great valleys or deep rock-basins; and thus his observations are quite in harmony with the conclusions given in my last year's 'Address.'

Visiting Labrador last summer, the author's views were strongly confirmed by what he there saw of the action of floating coast-ice; and in reference to the vast region of North America, he adopts the opinion I have long entertained, that the chief striation of its rocks and the distribution of northern blocks over so immense an area was produced when the country lay under the waters, rather than adopt what seems to me an extravagant hypothesis, that in former times a vast glacier extended from the North Pole to Georgia in the Southern division of the United States, or over much more than the half of the northern hemisphere; to say nothing of the non-existence of any lofty mountains on the north, from which such a monster glacier could have been propelled from north to south and have passed over higher lands in its southern progress. As many general readers will doubtless be gratified in perusing the telling anecdotes related by the author—whether derived from scenes in his own native Highlands, or from Lapland, Norway, the Alps, the Mediterranean, or North America—so I also believe that

geologists and physical geographers will find in the work 'Frost and Fire' a fund of original thought, which must act as a stimulus to the production of many most important results.

*Conclusion*.—Having now adverted to many of the leading geographical advances made by our countrymen since the origin of this Society, let me say that great as these steps have been, they still leave countless unvisited fields for the researches of ourselves and successors.

Thus, although a very large portion of Australia has in comparatively few years been more or less explored, yet we know that the spaces which lie between the routes taken by various travellers in the interior of that continent are of vast width, and that an enormous region entirely unknown separates the colonies of South and West Australia, whilst a large portion of the north coast, with its fine bays and headlands, has still to be surveyed and occupied.

In North America much stout work remains to occupy for many a year the most ardent explorers. For, although a great deal has been done by the enterprising travellers and geographers of the United States, and that the great territory of the Hudson Bay Company has been so much and so well examined since the days of Mackenzie, we have recently seen how a zealous young English nobleman and his companion * could bring to us fresh knowledge respecting the western side of the Rocky Mountains and a portion of British Columbia.

As to South America, we obtained proofs, even at our last meeting but one, of the imperfect acquaintance we possess of important parts of New Granada, now styled the United States of Columbia. Mr. Laurence Oliphant, indeed, recalled our attention to the often-disputed question as to the best and most feasible passage for ships or by rail across the Central American isthmus, and made us regret that in the very parallel where the Atlantic and Pacific approach nearest each other there, *i. e.* between the River Bayanos and Mandinga Bay, no European had traversed the intervening short space of 15 miles.† If we cast our eye on the map, and take the works of Humboldt and others in hand, we shall then see what great *lacunæ* have to be filled in on either side of the Andes, and what a prodigiously large portion of the interior of

* Viscount Milton and Dr. Cheadle; whose work, entitled 'The North-west Passage by Land,' is just about to appear. See also 'Proceedings,' vol. ix. p. 17.

† On this occasion General Mosquera, Minister of the United States of Columbia at our court, was present and addressed the Meeting.

Brazil, La Plata, and Patagonia, are still virgin fields. One of these desiderata is, I rejoice to say, about to be supplied, particularly as respects Natural History exploration. My eminent friend Professor Agassiz, at the head of a well-organised expedition sent forth by the city of Boston, and encouraged by our Honorary Member the enlightened Emperor of Brazil, is about to ascend the River Amazon and its upper tributary the Huallaga, and thence to cross the Andes to Lima. Returning to the cordillera and examining the environs of the lofty lake of Titicaca, Agassiz will recur to a line of research in which he was much distinguished in former years, and will endeavour to trace the lowest limits of the old glaciers of the Andes which he is led to believe must have existed in earlier times, but of which no traveller has as yet discovered a trace. Having satisfied himself on this point, he will return by following the course of the Madeira, a great affluent of the Amazon.

Looking to the wide spaces in the interior of Brazil, which are as yet occupied by a scattered population of Indians only, we may naturally expect that our enterprising Medallist Captain Burton, who is about to proceed to Santos as Her Majesty's Consul, may, under the patronage of the Emperor of Brazil, be enabled to gather for us many good additions to our present stock of knowledge respecting those extensive countries. In New Granada we want accurate descriptions of the cordilleras, while the great plains and mighty rivers to the eastward have not been traversed since the days of the searchers for El Dorado. The same may be said of Ecuador, Peru, and Bolivia. The Purus and other grand affluents of the Amazon are still practically unknown. In Southern Brazil, and especially in the Gran Chacu, wide tracts of country await exploration. In fact there are many thousands of square miles in South America that are almost as little known now as when the Spanish conquerors first landed in the New World.

If we turn to Asia, even that seat of the oldest civilisations presents to the eye of the geographer as many *terræ incognitæ* as Australia, Africa, and America.

In the huge empire of China and its dependencies what numerous journeys must yet be made to test the value of the recitals of Klaproth and other Chinese scholars respecting regions which have not been visited by Europeans since the days of Marco Polo, except by Huc and Gabet, whose works, however interesting in other respects, have failed in affording any sound geographical knowledge.

Among the undescribed tracts dependent upon China is, for

example, the great peninsula of the Korea lying between China proper and Japan. Extending over 10° of latitude (from 33° to 43° north lat.), this temperate country, known to be the seat of rich mines, much agricultural produce, and certain branches of manufacture, has hitherto been as completely shut out from Europe as Japan was until recently. Our Associate, Captain Allen Young, so admired for his Arctic services, has led the way in suggesting the desirableness of opening out a commercial intercourse with the capital of the Korea. Twice conquered by the Japanese, the Koreans are now tributary to China; ingots, furs, and other articles being annually sent as tribute to Pekin, with which capital they also keep up a trade in carts which travel round the head of the great gulf of Leotung.*

Now, inasmuch as European and American Governments have established commercial relations with the Chinese on the one hand and with the Japanese on the other, it seems almost certain, that with such a tempting intermediate prize stretched out before them, and along the coasts of which they are constantly sailing, speculative mariners and adventurers will ere long obtain the means of trading with this new land of promise. As, however, the current of public opinion in this country, differing widely as it does from that which prevailed in the days of Queen Elizabeth, is strongly opposed to any attempt being made to open forcibly new marts for trade, I apprehend that our Government would be under the necessity of discouraging any isolated efforts of individuals which might lead to political difficulties in the far East. At the same time there can be little doubt that any strong nation, not imbued with such scruples, may easily compel the Koreans to open their country and listen to pleas which no mere diplomacy nor private endeavours could possibly bring about. As soon, then, as this opening is made, geographers will have a grand new field for their researches, and they will verify or modify the stories which have been told us of the populous towns, rich productions, large navigable streams, and varied scenery of a peninsula as large as Great Britain!

With regard to other parts of Asia I may first point to New Guinea and here express my thanks to Sir Charles Nicholson for having specially called the attention of our Council to the importance of extending a survey of the accessible parts of this almost unknown land, lying within a few hours' sail of the north-eastern

* Captain Sherard Osborn informs me that when he was in Pekin he found the warehouses connected with Korea charged with the following products of that country: tobacco of first-rate quality, paper of great variety, woods of great use, short-staple silk, and many metalliferous ores.

promontory of Australia. This large island stretches from the Equator to between the 8th and 9th degrees of south latitude, possesses a length of 1400 miles, with an area twice that of the British Islands. Yet in looking over our volumes I discover but three notices respecting New Guinea. The first of these is a short notice, by the late Admiral Washington, of what the Dutch had been doing, and admitting that we ourselves had done nothing since the time of Dampier; since then, however, our surveying vessels the *Fly*, under Captain Blackwood, and the *Rattlesnake*, under Captain Owen Stanley, have surveyed large portions of the coast. The second notice is by Mr. Macgillivray, the naturalist of Captain Stanley's expedition, and the last by Mr. Alfred Wallace.

The Dutch have been more enterprising than ourselves, for between the years 1828 and 1835 they sent three different expeditions to New Guinea, which surveyed some portions of its little-known south-western coast, on which they made unsuccessful attempts to form settlements, being baffled by the insalubrity of its climate. The sum of our present knowledge of New Guinea is, that it is sparsely inhabited by stalwart negro savages, in a lower condition than the hunting tribes of North America; that, with some exceptions, it is clothed with a primeval forest, and that in its interior there exists a high mountain range, supposed to be of such elevation as to be snow-clad throughout the year. Its north-western peninsula produces ornamental feathers and the true aromatic nutmegs, once so esteemed but now so neglected. Of the mineral products of New Guinea we know nothing; but the survey of a coast which extends over some three thousand miles, even if we should be unable to penetrate far into the interior, well deserves the consideration of Geographers, to say nothing of the commercial advantages which may follow.

The next neglected country to which I would call your attention is the great group of the Philippines, consisting, according to Spanish estimate, of 400 inhabited islands, one of which is one-half larger than Ireland, and the whole containing (exclusive of mountain negroes) a population of the Malayan race, amounting to 5,000,000, tolerably civilised and converted to Christianity. Concerning this mighty archipelago of the Philippines, which is within a couple of days' steaming of China, of five days' steaming of our own settlements, and with which, exclusive of the Indian trade, we carry on a direct commerce of the annual value of above two millions and a half, there is not a single paper in our records.

Finally, the empire of Japan remains for interior exploration, with its computed 30,000,000 of people, the most ingenious and industrious of all the nations of Asia next to the Chinese. Our direct commerce with Japan is already of the value of a million and a half, the Japanese exports consisting chiefly of tea and silk,—commodities which the Japanese never exported before, and which must, therefore, be considered as the offspring of their newly-stimulated industry. Respecting this great country there are but two Papers in our records, one by our Consul at Hakodade, the port of the barbarous island of Yedo, and one by our distinguished Associate, Sir Rutherford Alcock, now happily for our science and the public weal, promoted to the Chinese Embassy.

Looking next to Arabia, let me remind you that it is only a year ago since we obtained a first glimpse of the nature and condition of the interior and its Wahabee inhabitants, through the adventurous journey of Gifford Palgrave. Here, again, we have still very much to learn; for, alas! we must confess that, with all our modern means and appliances, we are even now less acquainted with this huge peninsula than were the ancients in the time of their great geographer Ptolemy.

I had indeed the satisfaction of recently announcing to the Society, that this defect will in all probability be soon, in one essential respect, removed by the enterprise of Colonel Pelly, our Political Resident at Bushire, in the Persian Gulf, who not long ago visited and described parts of the coast of Persia, including the ports of Lingah and Bunder Abbass, and the remarkable saliferous island Kishm. Travelling openly, as an accredited British envoy, Colonel Pelly has taken with him into Arabia instruments to fix geographical positions, and men of science * to develope the geological structure, as well as the living fauna and flora, of the great central region around Riadh, the capital of the Wahabees. This is an enterprise worthy of our warmest commendation; for it has been undertaken by this enterprising public servant in consequence of his reading our 'Proceedings,' and learning from them that we attached the highest importance to the acquisition of this very knowledge.

Then in Central Asia—albeit many of our countrymen who have issued from Hindostan have done very much to clear away obscurities, we are, I regret to say, still waiting for the grand map on which, thanks to the energy and ability of a British Ambassador, the features of a broad band of country between Turkey and Persia

* Mr. W. H. Colvill, Resident Surgeon, Bushire, and Lieutenant Dawes.

have been for the first time laid down.* Without reverting to the tracts between Russia and Mongolia before alluded to, there are countries of unmeasured dimensions over which no Geographer has roamed.

I was, indeed, in hopes, as I stated at the last Anniversary, that, through the ability and learning of the eminent scholar and orientalist who I then thought would be chosen to fill the chair after this occasion, your attention would be directed to fresh fields of exploration in the East. And although Sir Henry Rawlinson cannot, I regret to say, undertake the duties of a President, I trust that, as one of our Vice-Presidents, he will so influence his old colleagues in the Government of India, as to induce them to cause an exploration to be made of the great unknown region between Hindostan and China, which is watered by the mighty River Burhampooter. This project has already been much supported, and was about to be undertaken, when, through the apprehension of engendering political embroilment, it was abandoned. Considering, however, the peaceful relations which now exist between our country, the Celestial Empire, and Japan, let us hope that this new line of intercourse may be opened, and that, instead of weakening, it may strengthen our alliance with those remote countries.

In thus adverting to some of the tasks which remain to be performed by Geographers in Asia, I may remark, that, notwithstanding all the labours of that vigorous veteran explorer and ready writer, my valued friend John Crawfurd, and of the sound naturalist Wallace, I have already shown that abundance of rich materials remain to be gathered in the Indian and Malayan Archipelago before we become thoroughly acquainted with the physical geography, geology, botany, ethnology, and meteorology of those highly diversified islands which range from Timor to the Philippines. The last-mentioned group, indeed, as I have already mentioned, is really little better known now than it was when discovered by the Spaniards.

In Africa, notwithstanding the efforts of our countrymen and

* The production of this great map is essentially due to the vigorous and clear instructions issued by our enlightened Associate, Viscount Stratford de Redcliffe, when he was Ambassador at Constantinople, and it has been chiefly executed by the persevering and able surveys of Lieutenant Glascott, R.N. In instructing Colonel Williams, now Sir William Williams of Kars, respecting that survey, Sir Stratford Canning, in a lucid despatch, dated Dec. 9, 1848, thus writes :—"Nor is it too much to hope that, by bringing the local features of a region hitherto little or not at all frequented by intelligent travellers to the notice of the civilised world, your commission may assist in extending the sphere of useful knowledge, and eventually in opening out new channels of commercial intercourse." Let us hope that the excellent maps resulting from this survey may at length be published by H.M. Government.

the researches of other nations, there are enormous tracts, as you all know, to which the first approaches are now about to be made by Livingstone, Du Chaillu, and Walker,* as well as by the spirited German explorer Charles von der Decken. The perusal of the excellent volume which Livingstone is just about to issue, with the assistance of his brother Charles, and the natural history details and descriptions of Dr. Kirk, and the geology of the lamented young Thornton, still leave the indisputable fact, that after all these praiseworthy efforts there are still large unknown regions in Southern Africa.

Considering the doubts and uncertainties which still prevail respecting the true watersheds of Central and Southern Africa, I proposed, as I have already stated, last year, to our Council that we should endeavour to remove these obscurities by promoting an expedition up the White Nile. Certain political circumstances, however, seem to render it but too certain that the ardent desire of Geographers and philanthropists to have the region below and above Gondokoro properly opened out as a highway of commerce, must for the present be postponed. Until some stop is put to the misconduct of traders on the White Nile in pillaging and making slaves of the natives, no hope can be entertained of realizing our anticipations.

What we have now to hope for is, that the vigorous Samuel Baker shall have been enabled to work out in the interior and determine one great feature of the geographical problem which Speke and Grant believed they had solved. When last heard of, Mr. Baker was at Unyoro, and we most earnestly hope that he may have been enabled to settle the question as to the southernmost origin of the waters flowing westward of the Upper Nile of Speke and Grant, which descend from the elevated plateau in which the great Lake Victoria Nyanza lies.† If, through his researches, the waters flowing into the Luta Nzige of Speke, as well as those of the river Kitangule, are found to rise in the mountains seen by him to the west of Karagwe, one of the ultimate tributaries of the Nile (for there may be many) will have been followed to its source. And if those mountains really range in an unbroken form from east to west, as represented in the map of Speke, the suggestion which has

* See Report of Council of R. G. S. for an account of the proposed journey of Mr. Walker to explore Equatorial Africa eastward of the Gaboon.

† It is highly gratifying to know that a Company has been established, which, having its head-quarters at Khartum, intends to develope commercial relations with the interior, particularly with Nubia. I also learn that the Pasha of Egypt sanctions one of the main projects of this Company, viz. that of enabling vessels to pass by the cataracts, through a system of canals and locks, thus rendering this mighty stream navigable from its mouth to Gondokoro.

been mooted of the possibility of the White Nile being fed from the Lake Tanganyika will fall to the ground.

In the mean time, however, it has been deemed highly desirable to endeavour to determine the watershed of Central Africa by an examination, in the first place, of the region lying between the Lake Nyassa of Livingstone and the Tanganyika of Burton and Speke, by sending a well-considered expedition to that part of Africa. The Council, therefore, willingly agreed to a proposal of my own, that the tried and successful traveller Livingstone should be the leader of such a survey. On this occasion my friend will not have the disadvantage, which attached to him in his last travels, of being hampered by other duties than those with which Her Majesty's Government may intrust him in a mission to the independent native chiefs who live to the north of the Rovuma River, and consequently beyond any district over which the Portuguese Government claim authority.* In addition to his efforts as a Geographer, he will at the same time be paving the way for the introduction of social improvements among the natives, by the promotion of fair barter and commerce, to the exclusion of the trade in slaves, and thus will act as a pioneer in removing those obstables which at present render the travelling of Christian missionaries into those wild and savage tracts, with which they are wholly unacquainted, not only a hopeless enterprise, but one which is fraught with disaster and profitless suffering. No one feels more strongly than the honest and long-tried Livingstone, that the introduction of a kindly intercourse through legitimate trade, and the establishment of confidence on the part of the natives, must be the forerunner of all efforts to convert the untutored negro to Christianity. That Christian missions may most profitably be extended into the interior from any settled British colony is, indeed, most true; and we can have no better proof of this than the great success of the venerable Moffat to the north of the Cape Colony. But such success could scarcely have been anticipated from a Church of England mission to the Portuguese territory on the east coast of Africa to which Livingstone recently bent his steps, and in which few persons, except one so acclimatized as himself, would be likely to succeed or indeed to survive.

In this new enterprise, Livingstone will first determine whether

* The Royal Geographical Society having taken the lead in recommending this Expedition, and having voted 500*l.* towards it, Earl Russell on the part of Her Majesty's Government, as before stated, took advantage of the opportunity, and appointed Dr. Livingstone to be Her Majesty's Consul and Envoy to the chiefs of Inner Africa with the view of opening out legitimate trade, and so check the trade in slaves.

his own Lake Nyassa receives any waters from the north, and next whether the Lake Tanganyika is fed by rivers coming from the south. He will then fix accurately the elevation of the Tanganyika, and, examining its western side, will ascertain to what extent waters flow into or out of it, and, if possible, he will further settle the great question of whether any waters may flow northwards from the Tanganyika towards the Nile, as suggested by Beke and Findlay, whose views have been recently adopted by Burton; or, on the other hand, he will decide if this lake is subtended on the north by lofty mountains, as drawn upon the earlier map of Speke.

Nothing short of actual exploration can determine these questions; for, it must be admitted that, though there is a space of about 360 miles between the Tanganyika and the Nyassa, yet, if it even be the fact that the former lake is a few hundred feet above Gondokoro, it is just possible that the waters should flow northwards from Tanganyika, provided there be an intervening low country to the west of the mountains seen by Speke and Grant. Geographers well know that some of the mightiest streams rise at very low altitudes. Thus, the Volga, which rises in the Valdai Hills at the low height of 550 feet above the sea, is a fine flowing river for a length of 2700 miles, and drains an area of 400,000 square miles before it falls into the Caspian Sea; and thus it is possible that the Tanganyika may be shown to be one of the main feeders of the Nile, and, if so, we shall have to admit that we were too hasty in our conclusions of last year respecting what was called *the source* of the Nile, albeit that no Geographer attached to that term the idea of a fountain or river-head, but simply that the Lake Victoria Nyanza was, as we supposed, the great water-basin of the mighty stream.

Such, doubtless, was the leading idea of Speke; and if he claimed too much in asserting his belief that the Victoria Nyanza was in that sense *the* source of the Nile, the conclusion on his part was very natural, seeing that this body of water was so much higher than the low and far distant Tanganyika, and that he had observed lofty mountains to the north of the latter.*

* Recently Signor Miani published a pamphlet at Constantinople, which he dedicates to me. With every wish that this Venetian traveller should have all due merit for labours which preceded those of Speke and Grant, but in which he never reached their southern latitudes, and in the hope that, in a third journey which he was about to make, he might be able to succour our countryman Baker, I wrote to my friend M. Hadinger of Vienna, and alluded to Signor Miani in encouraging and applauding terms. A translation of this letter was sent to the explorer, in which he states in his pamphlet that I styled him "*Esploratore profondo.*" Now, I could not have used this

In taking leave of the consideration of the unsolved African problems, let us not forget the resolute and self-possessed conduct of Du Chaillu, who, having exhausted all the means he had acquired by the sale of his striking work on the Gorilla region in fitting out a new expedition, has actually proceeded from Fernand Vaz into the heart of Equatorial Africa without one European companion—resolved to find some of the head-waters of the Congo or of the Nile. If he should be so fortunate as to fall in with the latter, and should follow them to where the mighty stream becomes navigable, and so descend to the Mediterranean, he will have performed a feat which will place him in the first rank of African explorers.

Among the desiderata on the eastern side of Africa, I must not omit to notice the interesting field of research which is offered to the geographer, geologist, and naturalist in Madagascar. At our last meeting * attention was called to our imperfect acquaintance with this huge, rich, and diversified island in which our missionaries, and particularly Mr. Ellis, have so signally distinguished themselves by introducing a written language and by inculcating Christian doctrines. We may indeed rely on the ability of Dr. Meller, one of the companions of Livingstone, the newly-appointed Vice-Consul at Antananarivo, who is about to proceed thither to make such observations as will improve the map of the island, made many years ago by Arrowsmith. At the same time I may remind you that in the twentieth volume of our Journal you will find a small map of the island by Colonel Lloyd and Mr. Corby, and also an abstract of all the manuscripts, books, and papers respecting Madagascar collected during the long possession of Mauritius by the French, as made by our Associate, Mr. W. J. Hamilton.†

I need not dwell at any length upon the subject which has of late so deeply engrossed your thoughts, and was discussed at three of your evening meetings—the despatch of an expedition to determine the real physical character of that great area of the Arctic region which lies around the North Pole. It has, indeed, been a source of the sincerest gratification to myself to see how the project, started by our Society,

expression in reference to this traveller, for I knew too little of his works as a Geographer to be authorised to speak of them as *profound*. M. Hadinger has indeed sent me at my request a copy of the paragraphs of my letter which probably, through a bad translation, have caused the mistake, and there is no such expression in them. I still trust that Signor Miani may, by uniting his travels with those of Baker, render us really good service in indicating the true physical features of the country south of Gondokoro.

* In a paper by Dr. Gunst.

† These documents were brought to England by a former Governor of Mauritius, the late Sir R. Farquhar, and were deposited by his son in the British Museum, where they may now be consulted with advantage by any one about to explore Madagascar.

has been supported by the Royal, Linnean, Geological, Ethnological, and other Societies. To take a lead in such a cause as this, and to be the body which has striven to carry it out by an appeal to the Government of our country, is at once an evidence of the high position to which our Society has attained. Deeply indebted to Captain Sherard Osborn for originating this proposal, and for the energy and ability with which he supported his own line of research, or that of proceeding, by a sledging-party, from vessels to be stationed in Smith Sound, by which the north-western flank of Greenland would be defined, we have also to record our obligations to Dr. Petermann for his advocacy of the search being made by pursuing the direct maritime route towards the North Pole from Spitzbergen. Your Council, seeing advantages in both schemes, would be too happy if, in the cause of science, each of them could be put into execution. But if one only can be obtained, we must leave it to our rulers to make the selection. At the same time let us be just, and say that, if the plan of Sherard Osborn be carried out, it is to the energy and spirit of an American citizen, Mr. H. Grinnell, and the devotion of that chivralrous explorer Dr. Kane, that we owe our first acquaintance with the coasts of Smith Sound and the tracts north of it which are to be the route of the proposed expedition.

Among valid reasons offered by the Councils of other scientific Societies, I specially direct your attention to the able appeal of the Naturalists made by the Linnean Society, as printed in our 'Proceedings;'* and I would also remind you of the words spoken to us in this hall by General Sabine, the President of the Royal Society, and himself the companion of Parry in his memorable voyages both to the Parry Islands and beyond Spitzbergen. In earnestly supporting the project, he told you "that it was not to be supposed in the present day, when the interest in geographical and in all the other physical sciences has so much increased, that so large a portion of the globe, lying almost at our hands, should remain unexplored."

It must also be highly satisfactory to the Fellows of this Society to be informed that a project, which has been so heartily approved by them and the other scientific Societies of the metropolis, has been applauded by foreign men of science, who are thoroughly competent to appreciate the difficulties to be overcome in Arctic navigation. Desirous of ascertaining the opinion of that eminent

* Vol. ix. No. iv.

Russian circumnavigator and Arctic explorer, Admiral Lütke, now President of the Imperial Academy of Sciences at St. Petersburg, I begged him to lay our project before the body over which he presides. In this way a committee of distinguished philosophers,* all of them great travellers, drew up a report, which was cordially approved by the Imperial Academy, as communicated to me by the Perpetual Secretary, accompanied by a most encouraging letter from the President himself, who assured me that the Imperial Geographical Society and the President, the Grand Duke Constantine, also warmly approve the project. Admiring the efforts we are making to obtain a North Polar Expedition, and thus add to the fame of former British and American † exploits, and eulogising the noble efforts by this country in the search after Franklin, the Imperial Academy points out what, indeed, I have myself previously indicated, that all our energies were at that time so directed among frozen channels between numerous large islands, as of necessity to prevent the examination of the region around the North Pole, which, judging from various circumstances, is in all probability largely occupied by water, and, if so, less cold and more accessible than the region around the magnetic pole. Seeing

* This Committee consisted of MM. Baer, Helmersen, Kupffer, and Savitch.

† No one who has frequented the meetings of our Society can fail to know with what sincerity and warmth the North American expedition, fitted out by Mr. H. Grinnell of New York, and so heroically commanded by Dr. Kane, has invariably been recognised by British Geographers (see my own Address of 1852, p. lxxix.). I am led to recall attention to this fact, from having read in the New York 'Evening Post' of the 9th May a criticism under the head of 'Arctic Exploration,' in which the editor points out inaccuracies in Capt. Sherard Osborn's allusion to the fitting out of the Grinnell expedition. Now, I feel certain that my gallant friend simply meant to impress upon others the idea with which he is thoroughly imbued, that nothing short of a thoroughly substantial Government expedition, expressly fitted out for the purpose and supplied for several years with provisions, can ensure complete success in a great Arctic enterprise. At the same time I regret that, in forcibly illustrating that view, his language should have been thought to criticise the deficiencies of the expedition fitted out by Mr. Grinnell. If persons who have doubts on this subject had only read all that Capt. Osborn said on the occasion, they would see that he fully appreciates the strenuous exertions made by Dr. Kane under unparalleled difficulties. I have before stated that our kinsmen were the first to open out Smith Sound, but I regret that the only printed account of Hayes's subsequent remarkable expedition along the west side of Smith Sound has but just reached me. From it I learn that the intrepid voyager went considerably further north than the extreme point reached by any of Dr. Kane's parties; he also penetrated for 50 miles into Greenland to examine the great interior glaciers. Believing from the pressure of ice that he had nearly reached the northern end of Greenland, he suggests that the western or Grinnell Land faces the great Polar Ocean. To Dr. Hayes belongs the credit of first pointing out the route towards the Pole recommended by Sherard Osborn, and I rejoiced in reading the concluding paragraph of the article referred to, in which a stirring appeal is made to Americans to be first in reaching the North Pole from those high latitudes which it is their glory to have attained.—*R. I. M.*, June 5, 1865.

that England has already accomplished so much in Arctic exploration, the Imperial Academy feel, like ourselves, that our country should not yield to any other nation the glory of determining this great geographical problem. The Academicians of Russia conclude by expressing their belief in the force of the sentiment to which our Council has given utterance, that this survey, in addition to keeping up the spirit of adventure in our navy, will be the best possible preparation for the future exploration of those Antarctic lands, on which, in 1882, the transit of Venus over the sun can alone be observed with accuracy.

Fortified by such powerful support, I have, on the part of the Council, appealed to the First Lord of the Admiralty and Her Majesty's Government, enumerating the advantages to be derived from a North Polar expedition, and at the same time have transmitted copies of all the various supporting documents from other Societies, together with the reports of our own discussions, in the earnest hope that the numerous and powerful reasons assigned may bring about a successful issue.

If, after all; we should fail in obtaining our request, we shall enjoy the satisfaction of having been sustained by the science of Europe, and of having been opposed by those persons only of this great maritime country who see no merit in any advancement of knowledge, if it does not carry with it political or monetary profit. Leaving, then, a more enlightened posterity to judge our motives, we may rely confidently on their verdict being given in favour of the efforts we have made to bring about the solution of this grand geographical problem.

I have thus endeavoured to present to you an outline—most imperfect, indeed—of some of the main discoveries with which this Society has been connected during more than a third of the present century, and also to sketch in a broad manner the many labours which have yet to be performed by ourselves and our successors. In following out this plan I have already extended this discourse to such full limits, that I may have exhausted your patience, without touching upon many subjects of the highest interest, particularly as to the progress of our science in other countries. The consideration of these topics must therefore be deferred to another occasion. It now only remains for me to thank you heartily for the friendly support you have tendered to me during the many

years I have had the honour of presiding over you. Such proofs of your good opinion and esteem, as well as that signal honour of having been named as your representative in the Royal Charter which constitutes us a body corporate, have penetrated me with feelings of the warmest gratitude.

At the last anniversary I distinctly stated that I should be under the necessity of resigning the chair at the close of the session; for I could not, at my time of life, calculate on being able to continue to discharge my duties to you, in addition to official service and other calls upon my time. Besides, I conscientiously thought that I should render you the best service by inducing you to select a younger man than myself; and in this spirit not only was the arrangement made, but the very paragraphs in the Address were written, in which the merits of my intended successor, Sir Henry Rawlinson, were indicated, when that eminent scholar and explorer, to my surprise and regret, found it impossible to undertake the duty. In this difficulty, my friends so strongly urged me to continue to serve that I have consented to complete my biennial term of office; and I have now only to assure you, gentlemen, that if you should re-elect me, I will make a last effort during the ensuing year to promote the best interests of the Royal Geographical Society.

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P.S. Since this Address was read, Lieut.-Colonel Pelly, H.M. Political Resident at Bushire, who has been alluded to (p. clxxiv.), has arrived in London. At our next meeting he will give us a sketch of his recent important journey from Kowait, at the head of the Persian Gulf, to Riadh, the capital of the Wahabees, where he was well received by the Imaum. He returned to the Persian Gulf by an entirely different route through El Ahsa to Okeir. Colonel Pelly and his associates have made many astronomical observations by night, unseen by the natives, fixing the latitude and longitude of places; thus contributing the first accurate data we have obtained respecting the geography of the interior of Arabia. Having also collected specimens of the rocks and wild plants of this north-eastern region, they have added data of great value to the original sketch of Inner Arabia, communicated to us in outline last session by Mr. W. Gifford Palgrave.

This last-mentioned traveller has just issued his completer

work under the title of 'Journey and Residence in Central and Eastern Arabia;' and after a rapid perusal I can commend it as a graphic and attractive account of the habits and life of the Arabians, from the wild Bedouins of the desert bordering on Syria, and those of the territory of Djebel Shomer, and of the strict Wahabee Mahommedans who inhabit the powerful kingdom of Nejed. Travelling as a Christian physician of Syria, Mr. Palgrave necessarily had intercourse with a great variety of characters, whose peculiarities he describes with great point; whilst his sketches of the features and statistics of the countries he passes through, including the coasts of Oman, and the details of his fifty days' residence in Riadh, the capital of Nejed, prove him to be a most skilful word-painter. For, although there is not a pictorial sketch in his two volumes, no reader can peruse them without obtaining a new and clear insight into the present condition of a country never visited by any European writer of modern times until Mr. Palgrave made his bold and successful journey.

*Note on the Boundaries of Russia and Northern Turkestan.*—A *résumé* of the progress of Geographical Science, during the past year in Russia, would be incomplete without a reference to the very important materials relating to the Geography of the Trans-Ili and Trans-Chu regions, which have been placed at the disposal of the Imperial Geographical Society, by the military authorities at St. Petersburg. The new materials, which I take from the last 'Compte Rendu' of the Imperial Geographical Society, received since the Anniversary, consist of a manuscript map, compiled by Colonel Poltoratski on the scale of 40 versts to an inch, of the southern portion of the Kirghis Steppe, or that extent of country which comprises the south-western portion of the territory of the Orenburg Kirghises or Little Horde, the southern portion of the territory of the Siberian Kirghises or Middle Horde, the Great Kirghis Horde, and the northern part of Western Turkestan or the northern portions of the Khanats of Khokand, Bukhara, and Khiva, collectively known under the name of the Turan. This extent of country is partly conterminous with the extreme south-eastern angle of the Russian empire, and, in consequence of the Russian military expeditions of last year, has attracted considerable public attention. In the map just mentioned are, for the first time, incorporated all the results of the Russian explorations undertaken during

the last few years; unfortunately their results have hitherto existed in an isolated form, and are to a great extent unknown to the scientific world.

Many astronomical points have been fixed along the course of the Syr-Daria, and on the Chinese frontier, which will serve as a true basis for a map of this region. The astronomical position of the whole of the above-mentioned country, and particularly that of Western Turkestan and of the Khanat of Khokand, must be considerably changed. Many points must be transferred to great distances both in latitude and in longitude. The mountains forming the western branch of the Thian-Chan, or Celestial Range, form the prevailing orographical features of the region; these mountains stretch from east to west from Issyk-kul, around which lake they bend, to the lower course of the Syr-Daria, and were formerly known under the vague name of the Kara-tau Range. All the mountains of the Thian-Chan system may be divided into three groups: namely, the Kentchi-Alataù, the Alexandrofski, and the Kazikurt Ranges. The Kentchi-Alataù Range consists of two parallel chains which gird the northern shore of Issyk-kul; they are separated (to the east of Issyk-kul) from the Thian-Chan by the Santash Pass. Their extreme elevation is 14,000 feet. From this group secondary chains of mountains extend to the north-west, and form the water-parting between the Ili and Chu. The second group—the Alexandrofski Range or Kirghisnin Alataù—the summits of which are covered with eternal snows, unites with the first or Kentchi-Alataù group near the western extremity of Lake Issyk-kul, at the Baùm defile; from thence it stretches in a straight line to the westward, reaching Aulieta, and separating the river Chu from the river Talas. Its greatest elevation is 15,000 feet. To the west of this range, a chain of hills extends as far as the Syr-Daria, and a parallel chain runs to Djulek, both forming, as it were, a continuation of the Alexandrofski Range. Their elevation does not exceed 5000 or 6000 feet, and to them properly belongs the name of Kara-tau which has been incorrectly applied to the whole mountainous system of this country. The third and last group—the Kazikurt Range—is situated to the south of the Alexandrofski, from which it is separated by the basin of the Talas, and apparently forms a continuation of the main branch of the Thian-Chan, which bends round the southern shore of Issyk-kul, and fills the territories of Khokand with its southern ramifications. The disposition of these chains

also determines the local water-system, the principal basins of which are those of the Chu and of the Syr-Daria. These two rivers divide the region into two parts, into the country of the Chu and the valley of the Syr-Daria, both running parallel to each other. The valley of the Syr-Daria extends in a sinuous line from the south-west to the north-west, the river Chu running in the same direction. Both basins corresponding with the distribution of the mountain-chains, become contracted towards the east, near Issyk-kul, where the abovementioned ramifications of the Thian-Chan converge. It must also be observed that the prevailing direction of the mountain-chains, both here and in all the mountainous parts of Central Asia is to the north-east. More precise data have been acquired respecting the Chu, particularly with regard to its sources, and its relation to Lake Issyk-kul, out of which it does not flow, but with which it is connected by its upper affluent, the Kuternaldy. The basin of the Syr-Daria along its middle course has been minutely and successfully examined by Admiral Butakof, who lately communicated to the Imperial Geographical Society the general results of his labours and of his explorations between the Fort Perofski and Baildr-Tugai. After the military expedition of 1862 the greater portion of the Kirghises, who roamed beyond the Chu, crossed over to the Russian side. The Khokandians, with the object of retaining the Khirghises in subjection, had erected a great number of forts or kurgans in the steppe. The principal of these were Pishpek, Merké, Auliéta, and Suzak. Auliéta, situated on the Talas, between the valley of the Chu and the chain of mountains which stretches from Issyk-kul westward, occupies an important position, as it stands on the great commercial highway which runs from Tashkend and Turkestan towards Veruvé, Kuldja, and Semipalatinsk. This route is followed by the caravans of Central Asia when proceeding to Russia and China. On a branch of this route, which leads direct from Khokand and Tashkend in a north-westerly direction to the point of junction of the routes of Orenburg, Troitsk, and Ufa, stands the town of Turkestan, which, no less than Auliéta, is important in commercial respects, and contains the most revered edifice in all Khokand—that of the mosque erected over the tomb of Azret Sultan.

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*June 30th.*—Just as this Address is about to be finally printed off, the gratifying intelligence has been received, through the Foreign

Office, that Mr. Samuel Baker has returned to Khartum, having made the important discovery of a second great lake, whence the Nile issues, and which he has named "Albert Nyanza." Judging from the latitude (2° 17″ N.) given in a very brief telegram, I have little doubt that this lake is the Luta Nzige heard of by Speke, and who enjoined Mr. Baker to explore it when the travellers parted at Gondokoro.

# PAPERS READ

BEFORE THE

# ROYAL GEOGRAPHICAL SOCIETY

## DURING THE SESSION 1864-65.

[FORMING VOL. XXXV. OF THE SOCIETY'S JOURNAL.
PUBLISHED APRIL 9TH, 1866.]

## I.—*On Lake Tanganyika, Ptolemy's Western Lake-Reservoir of the Nile.* By RICHARD F. BURTON, Medallist R.G.S.

*Read*, November 14, 1864.

καὶ μὴν καὶ παρὰ τῶν ἀπὸ τῆς Ἀραβίας τῆς εὐδαίμονος δια περαιουμένων ἐμπόρων ἐπὶ τὰ Ῥαπτὰ . . . μανθάνομεν . . . τὰς λίμνας δὲ ἀφ' ὧν ὁ Νεῖλος ῥεῖ . . . ἐνδοτέρῳ σύχνῳ.—*Ptol.*, lib. i. ch. i. 17.

THE following pages contain a notice, purely geographical, of a paper "The Upper Basin of the Nile, from Inspection and Information," by Capt. J. H. Speke, F.R.G.S., published in the 'Journal of the Royal Geographical Society,' vol. xxxiii., 1863. The sad event which cast a gloom over our meetings at the memorable Bath Meeting of the British Association in 1864, precludes the possibility of my entering into any questions of a private or a personal nature. On the contrary, I would here publicly acknowledge my recognition of his many noble qualities, courage, energy, and perseverance, but I cannot accept his "settlement" of the Nile. There are five objections to deriving the true Nile from the supposed Victoria Nyanza.

1. The difference of the levels in the upper and the lower part of the lake.

2. The Mwerango River rising from hills in the middle of the lake.

3. The road through the lake.

4. The inundation of the southern part of the lake for 13 miles, when the low northern shore is never flooded.

5. The swelling of the lake during the dry period of the Nile, and *vice versâ*.

It may, however, be observed *in limine*, that whilst refusing to accept the present "settlement" of the Great Problem, I in no wise propose to settle the question myself. This must be left to time.

* * * * * * *

The intelligence lately brought home by Dr. Livingstone and his scientific co-operator, Dr. Kirk, throws a remarkable light upon a hitherto dark question. It verifies in a striking way a detail of Ptolomeian geography, until now either ignored or accounted for by an error of copyists. I allude to the northern drainage of the Tanganyika Lake, and to the southern limit of the great Nilotic basin, as far as the latter is at present known.

In a letter from Dr. Livingstone, read at the meeting of the Royal Geographical Society, June 13, 1864, occurs this highly interesting statement:—

"With regard to the existence of a large river flowing into the northern end of Nyassa from Tanganyika, Dr. Livingstone was assured by all the natives of whom he inquired that there was no such stream, but that two small rivers alone enter the lake from the north. The numerous streams met with on this journey (viz., the last in 1863) flowing from the west seem to warrant the conclusion that no flow of water from Tanganyika is necessary to account for the great depth of the (Nyassa) lake and the perennial flow of the Shiré."

Dr. Kirk, who makes the Nyassa Water 200 miles long by 15 to 60 broad, stated, from personal observation, at the same meeting,—

"As to a river coming in from the north, the only ones we heard of were two small ones; one named in a generic way the Rovu, which simply means 'river,' and the other, which they describe as a small river coming in from a marsh."

Since that time, Dr. Kirk kindly placed in my hands, with permission to publish, the following valuable note:—

"The region between the Nyassa and Tanganyika Lakes being as yet unexplored, our knowledge of the animals inhabiting these waters becomes of some interest in guiding us to a solution of the vexed question as to their continuity or their separation. On the former supposition the Tanganyika must belong to the Zambesi hydrographic basin, otherwise it will pass to the Congo* or the Nile.

"When the Tanganyika was discovered, a collection of its shells was formed by Capt. Burton; the same has been done on the shores of the Nyassa by myself. Between these there is *no* community of species, while both contain many new forms.

"Among those from the Nyassa is one of a type for the first time observed

* My visit to the Rapids of the Congo River in August and September, 1863, convinced me that the north-eastern or smaller fork of that great river issues from an equatorial lake quite unconnected with the Tanganyika. At this moment it may have been visited by my enterprising friend Paul du Chaillu.

in Africa, being large and handsome it could not easily be overlooked were it present in the Tanganyika.

"On the other hand, Capt. Burton's collection possesses one allied to a species common on the Nile, and unknown on the Nyassa. This favours my opinion that no communication exists between the two waters.

"We now know that the fish of the Nyassa Lake are peculiar to itself, and differ from those of the Lower Shiré, its outlying stream, which is isolated from the upper part by a formidable series of falls and rapids. Of the fish of the Tanganyika nothing is known, otherwise this geographical question might be almost set at rest.

"The wide distribution of animals and plants over Tropical Africa is in strong contrast to the very local and peculiar nature of the fauna of its great fresh-water lakes.

"(Signed) J. KIRK."

Dr. Livingstone personally favoured me with details concerning a weed from which the accolents of the Nyassa extract their salt. That great traveller wrote:—"I thought that I had a specimen of the plant which floats ashore at Lake Nyassa, and from which the natives obtain a salt used in cooking, but I cannot find it. When chewed its taste is distinctly salt. If so used in Lake Tanganyika, it may account for the freshness, though I confess I feel more inclined to the theory of an outlet still unknown." This remarkable lacustrine production is wanting to the Tanganyika water, and its adjacent tribes are obliged to transport the condiment from various diggings lying at considerable distances. Dr. Kirk has thus explained the matter:—

"Understanding now your question, I may attempt a reply.

"The weed gathered and burned, whose ashes serve as a relish to food for the Nyassa natives, is the *Potamogeton pectinatus* of Linnæus. With this is often mingled small quantities, perhaps accidentally, of *Valisneria spiralis*. Where salt is plenty, I have never known this used.

"Salt is washed at the south end of the Nyassa, and carried up its western bank for sale. It was a good way up the western shore, and at a distance from any salt-washings where I saw the weed collected.

"(Signed) J. KIRK."

Thus, it is evident that there is no connection between the Tanganyika and the Nyassa reservoirs. What, then, I would inquire, becomes of the surplus water from the Tanganyika Lake?

In company with the lamented Capt. Speke I explored, in February, 1858, that great basin since identified by Mr. Hogg with the "Zambre" or "Zambere" of old geographers.* We dwelt on its eastern borders till May 25, visiting (April 26) Uvira, our farthest northerly point, about 10 or 12 miles from the end of the lake. There my hopes of discovering the Nile Sources

* P. 4 of a learned paper, 'On some old Maps of Africa in which the Central Equatorial Lakes are laid down nearly in their true position.' From the Transactions of the Royal Society of Literature.

were rudely dashed to the ground. Receiving a visit from the three stalwart sons of the local sultan, Maruta, the subject of the mysterious stream which all my informants, Arab as well as African, had made to issue from the Tanganyika, and which for months we had looked upon as the Western Head-Stream of the Nile, was at once brought forward. All declared (probably falsely) that they had visited it: all asserted that the Rusizi River enters into, instead of flowing from, the Tanganyika. I felt sick at heart. The African's account of stream-direction is often diametrically opposed to fact: seldom the Arab's. In this point I differ totally from Capt. Speke. But our unruly crew of Wajiji savages would not suffer us to remain at Uvira, much less to penetrate northwards. We were therefore compelled to return hurriedly, and thus, as I have related ('Lake Regions of Central Africa,' vol. ii. p. 117), the problem was fated to remain a mystery.*

Respecting the Southern Tanganyika, the Arabs of Kazeh, who have frequently and in large parties visited the lands of the Marungu lying at the extremity which faces Nyassa, positively informed me (*loc. cit.* p. 153) that the "Runangwa or Marungu River, which drains the southern countries towards the Tanganyika, equals the Malagarazi (or eastern feeder of that lake) in volume;" and all agreed in making it an influent, not an effluent. Had there been an important stream in that direction, the colony of Arab merchants which for several years has inhabited Lusenda or Usenda,† capital of the Cazembe, lying to the south-west of the Tanganyika Lake, would soon have found their way northwards The same consideration renders Mr. Cooley's confusion of three lakes into one a moral impossibility. Like a navigable river in Arabia, such a waterway, 800 miles in length, would have altered the state of the whole African interior.

Returning to England in May, 1859, I found geographers unwilling to believe that a reservoir, 250 or 300 miles long, by 33 or 40 broad, and situated at a considerable altitude in the African zone of almost constant rain, can maintain its level without efflux. Moreover, they argued that the freshness of the water would under normal circumstances prove the escape of saline substances washed down by tributaries from the area of drainage.

The 'Journal of the Royal Geographical Society' (vol. xxx.

* I distinctly deny that any "misleading by my instructions from the Royal Geographical Society as to the position of the White Nile," left me unconscious of the vast importance of ascertaining the Rusizi River's direction. The fact is we were helpless; we did our best to reach it and we failed.

† First visited by Dr. Lacerda in 1798. Generally placed about s. lat. 8° 10′ and E. long. 29°. Of late years many Arabs and Sawahilis have settled there.

1860) lost no time in offering a solution of the "strange hydrological puzzle." Earl de Grey's Address thus enters upon the question:—"The configuration of the country to the northward (of the Tanganyika) gives us excellent reason to believe that the northern tributary is correctly described; but whether the river mentioned as *entering* the lake at the south does not really run *out of it*, is a fair matter for discussion." The visits of Dr. Livingstone to the Shirwa and Nyassa Lakes, then not thoroughly explored, the circumstance that the three waters, Tanganyika, Nyassa, and Shirwa, were approximately at the same level,* and the possibility that the Tanganyika might be the highest of them all, afforded a satisfactory hypothetical solution. The connexion, with or without small intermediate waters, between the Tanganyika and the Nyassa, would account for the surplus waters of the former, and for the non-variation of height in the splendid Shiré River which drains the latter.

On the other hand, Capt. Speke, shortly after our return, published, much against my wish, two papers in 'Blackwood's Edinburgh Magazine' (No. lxxvii., August and September, 1859). They were accompanied by a sketch-map, in which, to my astonishment, appeared a huge range, estimated to rise 6000 or 8000 feet, and dubbed the "Mountains of the Moon." At first the segment of a circle, it gradually shaped itself into a colt's foot or a Lord Chancellor's wig, and it very effectually cut off all access from the Tanganyika to the Nile. Without recalling to mind things that should be now forgotten, I must record my unceasing struggle against the introduction of a feature which was frequently copied into popular maps abroad and at home.† All that Capt. Speke could say of the Lunar Horse-shoe was explained in our Journal (vol. xxxiii.) "Both the Arabs and the natives said the Rusizi (at the northern end) was a very large river, much greater than the Malagarazi River . . . . for which reason I imagined the mountains encircling the head of the Tanganyika must necessarily attain an altitude of from 8000 to 10,000 feet." These heights, as the Editor of Volume xxxiii. justly remarks, were "not shown in Capt. Speke's map of the route sent home after the visit to the Tanganyika head; nor in his sketch-map sent in July, 1858. It

* Capt. Speke had placed the Tanganyika at 1844 feet above the sea. Dr. Livingstone gave 2000 feet of altitude to the Shirwa: difference, 166.

† "We find in the centre of Africa a high group of hills surrounding the head of the Tanganyika Lake, composed chiefly of argillaceous sandstones, which I suppose to be the Lunæ Montes (!) of Ptolemy, or the Soma Giri of the ancient Hindus" (??). Capt. Speke's 'Journal of the Discovery of the Source of the Nile,' Introduc. p. xv. In p. 263, he owns to having built up these mountains "solely on scientific geographical reasonings," and he actually falls into the venerable error of deriving from almost the same source the Nile, the Congo, and the Zambesi.

was impossible to see them on either journey. In the first expedition the alleged north point was not approached within 160 miles, and the formation of the head of the lake prevented distant view in any direction. During the second exploration the nearest and highest point, the Mfumbiro Cone, raised to 10,000 feet, supposed to have been 50 miles distant, and the centre of the range is marked as 150 miles from the nearest point of the route." In Capt. Speke's original map, sent from Egypt to the Royal Geographical Society, and published by Mr. E. Stanford, June, 1863, this moon-shaped range is not laid down; the name is given to two parallel sierras flanking the northern end of the Tanganyika, and far south of the position attributed to the Mountains of the Moon in his later map.* The objectionable feature was, after three or four years, duly rejected.

During his last march, Capt. Speke apparently coincided with Earl de Grey's Address, using these words (vol. xxxiii. p. 324): "It was a pity I did not change the course I gave to the Marungu River (*i.e.* making it an effluent not an influent), but I forgot my lesson, and omitted to do so." In his Journal (p. 90), he thus expresses himself:—"Ever perplexed about the Tanganyika being a still lake, I inquired of Mohinna and other old friends what they thought about the Marungu River (at its southern extremity); did it run into or out of the lake? And they all still adhered to its running *into* the lake, which is the *most conclusive argument* that it does run *out* of the lake." A truly extraordinary train of reasoning!

Presently it became evident to every geographer who cast his eye upon the map produced by the Nile Expedition of 1860-1863, that the Rusizi River might drain the Tanganyika Lake either into the water called the Luta Nzigé—Dead Locust—or by some other means into the White River, through the Nile. Many years ago Mr. Macqueen received from a native of Unyamwezi the following remarkable statement, touching the Tanganyika:—"It is well known by all the people there, that the river which goes through Egypt takes its source and origin from the Lake." (Journal Royal Geographical Society, vol. xv. pp. 371-374.) Captain Speke, on return from his first trip to the Western Tanganyika, thus recorded the information given by Shaykh Hamed bin Sulazyim, a respectable Arab trader:—"A large river called

* Says Mr. Hogg (p. 38), "In the map published by Mr. Edward Stanford, June 22, 1863, and signed by Capt. Speke, '26 February, 1863,' the mountains termed by that traveller the 'Mountains of the Moon' are placed at the north extremity of Lake Tanganyika; but in his own map, published in his Journal in December last, Capt. Speke in the construction of it has altered their position and inserted them around the west and north sides of the more northern Lake Rusizi—N.B. manifestly a widening of the river—and has also given them a certain mythical colt's-foot form."

Marungu supplies the lake at its southern extremity; but except that and the Malagarazi River on the eastern shore, none of any considerable size pour their waters into the lake. But, on a visit to the northern end, *I saw one*, which was very much larger than either of them, and *which I am certain flowed out of the lake;* for, although I did not venture on it, in consequence of its banks being occupied by desperately savage negroes, inimical to all strangers, *I went so near its outlet that I could see and feel the outward drift of the water.*"—(Blackwood, Sept., 1859, and 'What led to the Discovery of the Sources of the Nile?' p. 21. N.B.—The italics are my own.) Several authors have recently recorded their adherence to this opinion. My learned friend Mr. W. S. W. Vaux ("On the Knowledge the Ancients possessed of the Sources of the Niger," from the 'Transactions of the Royal Society of Literature,' vol. viii. New Series, p. 29), thus expresses himself:—"I cannot myself help thinking that this Luta-Nzigé will be ultimately found to be one of a chain of lakes of which the Tanganyika is the largest and most southern; the more so, as I have already stated I feel no confidence in the emplacement of Capt. Speke's 'Mountains of the Moon,' which, on his map at least, would bar any outlet from the southern to the northern lake." Others have hypothesized a gorge or valley by which the Tanganyika waters might flow northwards through the "Colt's-foot Range," which has, I have said, now been abolished. Mr. John Hogg (*loc. cit.* p. 23) refers to his Plate III., a map published in 1623 by the most distinguished geographer of his age, Gerhard Kauffmann, who is better known by his Latin name of *Mercator*, he having been the inventor of the geographical *Projection* called after him. "In this system 'Nilus fl.,' as Ptolemy believed, derives his western fork from an immense water named Zaire or Zembre Lacus, and corresponding with our Tanganyika. The eastern arm issues from 'Zaflau Lacus,' the *Zambesi* of some authors, and corresponds with the lake now called Maravi or Nyassa. Another branch of the 'Nilus,' at about 1° south of the Equator, flows from a smaller nameless lake, at the north extremity of which is a place called 'Garava.'" Mr. Hogg suggests this to be a corruption of "Ukerewe," meaning in the local tongue Island-land. Finally the south-easternmost feeder proceeds from a lake, "the *Barcena*, which is doubtless meant for the Baringa, for the word may also be written Barenca or *Barenga*." It is clearly the Bahari-Ngo, the "Great Sea or Water," yet unexplored, and placed in our maps as the "Baringo." Dr. Beke, the traveller who had the solid merit of suggesting a feasible way to explore the Nile basin, quotes De Barros:—"The Nile has its origin in a great lake (the Tanganyika), and after traversing many miles northwards it enters a very large lake which lies under the

Equator." This would be either the Bahr el Ghazal (the Nile of Herodotus) or the Luta Nzigé; on the other hand, the Portuguese travellers were fond of distorting the Ptolomean geography. The same geographer, in an admirable lecture lately printed,* thus records his matured opinion:—"Whereas in the Map inserted in the 'Sources of the Nile,' I marked Tanganyika as being within the 'not impossible' limits of the basin of the Nile, I am now inclined to place this lake within the *probable* limits of that basin, and to make it, in fact, the upper course of the Giant River of Egypt."

An objection to the theory that the Tanganyika Lake drains into the Luta Nzigé at once suggests itself, and it would be fatal if reliance could be placed upon it. I allude to the levels. Lake Tanganyika is allowed but 1844 feet. Capt. Speke (p. 332 of the Journal of the Royal Geographical Society, vol. xxxiii.) argues that the Luta Nzigé is 2161 feet, or upwards of 300 feet above the Tanganyika. But his B.P. observation was made at Paira, a station distant from the stream, and even to obtain that altitude he was obliged to add the mean of certain differences, 368 feet: this emendation is not generally accepted. During our exploration of Tanganyika the state of our vision would, I am convinced, explain a greater difference than the fraction of a degree. Without reference to variation of barometric pressure, our thermometer had altered from first to last 1° (F.) = 535 feet. On our return to Konduchi, a harbour on the eastern coast, our B.P. thermometer boiled at 214° (F.). This alone would give a difference of about 1000 feet. Thus the Nyanza water was made 3550 feet high by the first Expedition. The second raised it to 3745, and made it drain, by the Luchuro or Kitangule River, "Little Lake Windermere," which being placed at a figure of 3639, thus runs 106 feet up hill. I may also observe that whilst the "Ripon Falls" (12 feet high) are placed at 3308 feet above sea-level, the "Victoria Nyanza" rises 3740, which gives to the surface of the supposed single Lake a difference in level of 432 feet.

I adduce this case out of many, to show how unreliable are such approximations of altitude. It is, however, gratifying to find that Captain Speke places Gondokoro, which some have raised to 1600 feet, at a figure of 1298, whilst Mr. Consul Petherick (February 25, 1863) reduced it by a mean of three observations to 1265. Assuming Gondokoro in about 5° N. lat. to be even 1600 feet above sea-level, we still have from the head of the Tanganyika Lake, in 3° s. lat. (8° × 60° = 480 direct miles), a fall of 244 feet. Captain Speke's and Mr. Petherick's observations would give 550 feet, an

* 'On the Sources of the Nile,' &c. &c, delivered in the Theatre of the London Institution, Jan. 30, 1864, by Charles T. Beke, Esq., PH. D., F.S.A.

ample inclination. Moreover the Luta Nzigé is theoretically placed 1000 to 1200 feet lower than the Nyanza Lake, that is to say, between 2350 and 2550 feet above sea-level, and the altitude has been further reduced to 2250.

But truth to say, very little fall is required for the 200 miles separating the Tanganyika and the Luta Nzigé, and the want of inclination explains the marshiness of "the sort of backwater to the great river." A correspondent of the 'Morning Advertiser' (March 22, 1864), supposed to be the African geographer, Mr. M'Queen, remarks of the Dead Locust Lake, "at this point should commence the supposed backwater of 166 miles in length towards the S.S.W. But how are we to arrange the subsequent descent of the river beyond the northern point of this lake. To the point where the river is met with beyond Paira, 120 miles from the Karuma Falls, the descent is stated to be 1000 feet (say 400 feet higher than Gondokoro), and consequently 300 feet below the level of the north point of the Luta Lake. How, then, could the Nile form a backwater for this? This is not thought of nor explained. The fact is that this backwater expanse was, we believe, made out in London in order to cobble something like consistency and unity, and also to account for the diminution of the river in magnitude, which they found as they advanced northwards."* Dr. Beke (*loc. cit.* p. 25), on the other hand, observes that "Captain Speke adopted the conjecture of Dr. Murie, whom he met in Gondokoro." This "backwater" enabled him to explain how, with a fall of 2·5 feet per mile, the waters of the river occupied 86 days in flowing down 200 geographical miles—in other words, 2·25 miles in 24 hours.

Thus by draining the Tanganyika, so as to maintain its surface at an almost constant level, the meaningless backwater would resolve itself into a link in the lake chain, the *Nili Paludes* of the ancients, now usually placed in N. lat. 5°. They are called *immensas paludes*,† a title which they deserve better than the No, Nuvier, or Bahr el Ghazal. In Seneca's account of the contemporary journey made by the two centurions despatched by Nero *ad investigandum caput Nili*, about 70 years before Ptolemy's day, we find that they travelled 800 to 890 Roman miles from the upper and more recent Meroe, that is to say, reaching N. lat. 3° or 4° ('Nat. Quæst,' lib. vi. chap. 8). The two rocks from

* What, however, does the learned reviewer mean by "Sellina Oros" in this passage? "But lest we should be mistaken, we called the attention of an Oxford scholar to it, and he told us that '*Sellina Oros*.' Moon Mountain, in the singular was the correct reading. Can this be τὸ τῆς Σελήνης Ὄρος of Ptolemy (lib. 4, chap. 8)? If so, verily, 'Oros' hath been "translated."

† Why this water, being 160-180 miles long, should be called the *Little* Luta Nzigé, and where the Great one is, I am at a loss to determine.

which the vast force of the water broke forth is a feature remaining to be described; it may allude to a rapid at the southern extremity of the Luta Nzigé.*

The principal alterations which I would introduce into the map appended to Captain Speke's paper (vol. xxxiii. Journal Royal Geogr. Soc.) are as follows:—

1. Draining Lake Tanganyika into the Luta Nzigé.

2. Converting the Nyanza into a double lake, the northern part fed by rivers from the western highlands, and the southern by small streams from the south to the south-east. The former in Captain Speke's book appears to be merely a broadening of the Kitangule River, and thus only can we explain the phenomenon of six large outlets in 30 geographical miles.† He was no linguist, and we find in his journal that the (Great Victoria) Nyanza may mean "a pond in the palace," (p. 324)—"a piece of water, whether a pond, river, or lake" (p. 389), or "the Nile." Despite the traveller's prepossessions, we find (p. 469) that even in the moment of triumph he asked himself if the volume of the Kitangule River was not equal to that of "the Nile," and he answered the question in a very unsatisfactory way.

It will be remembered that, during his third expedition, Captain Speke, instead of striking as before the south of the Lake, and coasting or marching along it, nowhere sighted the Nyanza waters till he reached Mashondé, about 50 miles south of the Equator. His words are (Journal, p. 272): "We sought for and put up at a village beneath a small hill, from the top of which I saw the Victoria Nyanza for the first time on this march." He had then left unvisited a gap of 2° 15′ (= 135 miles) between this and the spot where he saw the Lake during the first expedition. Yet when returned to England he at once rejected the normal dotted line

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* At the cataracts of Makedo, M. De Bono learned from the natives that the river fell some 9 perpendicular feet, and that four or five days south of these falls it rose from an immense lake into whose other extremity a river fell. M. Lejean at first conjectured this to be the Nyanza. After the second expedition he proposed the Luta Nzigé, N. lat. 0°—3°. (Bulletin de la Société de Géographie. Cinquième Série, tome vi.).

In Capt. Speke's Journal (p. 466), we find that the Waganda still call the "Ripon Falls" *stones*.

† Within a distance of 1° the map shows three first-rate streams, viz. the Mwerango, or Mwarango, the Luajerri, and the Napoleon Channel issuing from the Nyanza Lake. I believe this to be a physical impossibility, and the same is acknowledged by the Bulletin (p. 261). In p. 281 of his Journal, Capt. Speke was informed by "all the men of the country" that the Mwerango rose "in the hills to the southward," or came "from the lake;" and he adopted the latter, because it suited his preconceived opinions.

The 'Westminster Review,' vol. xxv. p. 315. New Series, suggests that Capt. Speke, in assuming his "Victoria Nyanza" to be a single lake, was mistaken just as were the Mombas missionaries with respect to their Ujiji or Unyamwezi Lake. I had not read that Review when the above was written.

that shows uncertainty, and inserted the regular survey trace. The northern water was probably a widening of the great Kitangule River, a projection of the extensive Luchuro Valley. He saw it at certain intervals as far eastward as the "Ripon Falls;" but the "spur of a hill" in Kira shut out his view of the outlet of Napoleon Channel. On the other hand, it may have been one huge lagoon, or several small lagoons. We may observe that nowhere in the cuts of the Journal (*e. g.* p. 390) is a sea-horizon shown. If the line of water be continuous, how is it that the Usoga defeated Mtesa's army, when a fleet of war-canoes could have been sent? His actual inspection of the Nyanza was about 50 out of 450 miles; all the rest was hearsay. He travelled in the conviction that the lake was on his right; but he never verified that conviction. When living with Rumanika of Karagweh, at some 60 direct miles from *the* Lake, he did not assure himself of its existence. The King of Uganda detained him two months in his palace without allowing him to see the water, distant a five hours' march. The offer made to him by King Mtesa, namely, to send him home in one month by a frequented route, doubtless through the Masai country on the east of Nyanza (p. 294), points to a direct road which can only be explained by the separation of the Nyanza into two or more waters. So in p. 187 of Captain Speke's Journal, Irungu of Uganda expressed his surprise that the traveller had come all the way round to Uganda, when he could have taken the short, safe, and well-known route *viâ* Masai-land and Usoga, by which an Arab caravan had travelled. His words are: "He (Irungu) then told me he was surprised that I had come all the way round to Uganda, when the road by the Masai country was so much shorter." In p. 130 the petty chief Makaka assures Captain Speke that "there were two lakes and not one": unfortunately the hearer understood that the Bahari-Ngo was alluded to. At Mtesa's court, Maribu, the officer sent to fetch Captain Grant, said he should *walk* (about half the way over hills and bad land) to the mouth of the Katonga influent, boat it to Sese Island, where Mtesa keeps all his large vessels, and be at Kitangule River in a very short time (p. 317). This would also suggest the widening of the Kitangule River above alluded to. In p. 197 he mistakes "the broad waters of Luero lo Urigi" for the Nyanza itself, and gives a fabulous account of how the former lake had "become a small swamp." In p. 428, Murondi, who had once travelled to the Masai frontier, said "it would take a month to go in boats from Kira to (the) Masai (country), where there is another Nyanza, joined by a strait to the big Nyanza, which King Mtesa's boats frequent for salt;" but the same distance could be accomplished in four days overland, and three days afterwards by boat. In p. 333 he hears from "Kidi officers" of a high mountain behind the Asua River, and a

lake navigated by the Galla "inhabitants" in very large vessels, but he never investigates the report. The islands offer a mass of difficulties, to be explained only by supposing a shallow bed, or that they are part of the mainland. The group, forty in number, called Sese (p. 399), one of which Captain Speke (p. 276) placed opposite Kituntu, off the mouth of the Katonga River, and where the King of Uganda keeps one of his canoe-fleets, were omitted, against the explorer's desire, from the map of the Royal Geographical Society, also the Kitiri Island (p. 399) on the way to Usoga, and the reefs and shoals (have Africans words for these fine distinctions?) are not indicated. Then he comes across another mysterious island, in which the African Neptune, Mgussa, dwells. Lastly (p. 492), there is an island on the Nyanza to which Captain Speke wished his deserters transported.

3. Detaching the Bahari-Ngo from the Nyanza waters. This reservoir (the Baharingo of M. Léon d'Avanchers and Mr. Missionary Erhardt, and vulgarly Baringo, as written by Mr. Missionary Krapf, who first heard of its existence) drains the mass of highlands between the Equator and 3° s. lat., and sends forth what M. Miani, the discoverer, calls Ascia or Acioà, and which Captain Speke names the Asua. I believe it to be the real White Nile, the so-called Nyanza effluents being of minor importance. "It is by no means improbable," says M. Vaux, "that we may hereafter discover, as Dr. Beke has urged more than once, *a* source of the Nile in a chain of mountains to the south-east of the lake Nyanza —a discovery which will confirm in a signal manner all the essential inferences he has deduced from his informants" (p. 24). In p. 598 of Captain Speke's Journal we are told that the Asua cannot issue from the Nyanza, "as its waters were falling and not much discoloured." Yet in his map he derives it from the Bahari-Ngo, and connects the latter with the Nyanza, directly contradicting himself. Only by assuming the Asua to be the true White Nile, and to head in highlands, can we account for the snows of Æschylus ('Æthiopis Fragm.' 139, ed. Didot) and Ptolemy (τὰς χιόνας, lib. iv. chap. 8) with which the Moon Mountain feeds the two lake reservoirs of the Nile, and for the express statements of Brun-Rollet and other Piedmontese travellers, all of whom trace the Nile from the land of the Madi up to the mountains in the south-east. Thus, too, can we explain the Arab epithet "White" applied to the true Nile,* the colour of glacier water. Dr. Krapf

* The Bahr el Azrek, or Blue River, like the Rhone after issuing from the Lake of Geneva, the Bahr el Aswad, Tacazze, or Black River (Atbara, Astaboras of Ptolemy), so-called from its dark earthy tinge during the rains. The Bahr el Abyaz, or White River, distinctly points to glacier-water. A muddy stream can hardly issue from a lake.

"In a lecture delivered before the Literary and Philosophical Society of

also heard, when near Kenia, of a river running from the south-east and forming the head-waters of the Nile. Since my return from Zanzibar in 1860, I have never ceased to recommend a reconnaissance of the Nile *viâ* Mombas, where a march of 300 instead of 1100 miles through an easy country, at a far less cost than 7000*l.*, would give very different results from the "gigantic ignis fatuus" that has lately amazed the public, and has reminded thoughtful men of a similar statement, as ecstatically made some ninety years ago by Abyssinian Bruce, and as unreasonably received by the unscientific public.

Viewed by this light, how admirably exact in A.D. 136 was Ptolemy the Græco-Egyptian's description of this mysterious region. His Αἰθίοπες Ἀνθρωποφάγοι, inhabiting the "Barbaric Gulf"—lands between Menuthias (Zanzibar) Island and the Mountain of the Moon (Kilima-njaro and its neighbours)—are the cannibal Wadoe. The melted snows have been discovered in Chhaga by Baron Carl von der Decken and his lamented companion Mr. Thornton, despite all the dicta of Mr. Cooley. The name "Mountain (chain) of the Moon" is manifestly a Greek translation or adaptation of Unyamwezi, which Mr. Cooley insists upon corrupting to "*Monomœzi.*"* Ptolemy places this chain in 57° E. long. and 12° 30′ S. lat., extending latitudinally 10° (=600 miles) to 67° E. long., and 12° 30′ S. lat. The longitude, as Mr. Hogg suggests, might have been computed from S. Antonio, and thus would answer to 32° and 40° east of Greenwich. This includes the ivory highlands of Chhaga, and the mass of mountains, Mfumbiro, &c., to the west of the supposed Nyanza. I have treated this question at length in my 'Lake Regions of Central Africa' (vol. ii. p. 178), and have not found reason to alter my opinions. The older theory (see M'Queen's 'Geographical Survey of Africa,' p. 240) which makes the Lunar Mountains extend from Camaroons in 3° 40′ N. lat., in an E. by N., and E.N.E. direction to Guardafui, has long since been abandoned.

As regards Ptolemy's latitudes, it must be remembered that he and his predecessor, Marinus of Tyre (the Maury of antiquity), drew their information from the logs of traders who travelled on

Newcastle-upon-Tyne, Mr. Brayley expressed the opinion, that assuming snowy mountains to supply water to the Nyanza, that water must necessarily issue from glaciers: for from the relative properties of fluid and solid water, it is impossible for a body of perpetual snow—that is to say of snow at the lower limit of perpetual snow—to become a body of water, without first passing into the state of glacier-ice."—Dr. Beke (*loc. cit.* p. 26).

* Dr. Beke, as early as 1846-48, before the Snowy Alps of Eastern Africa, Kilima-njaro and Kenia, were discovered, converted Ptolemy's latitudinal into a meridional range of Lunar Mountains. I cannot believe that the learned Pelusian made any such mistake; and I find between E. long. 30° and 40°, and from the equator to s. lat. 3°, a mass of peaks and highlands forming a remarkable equatorial sierra.

the eastern coast. He places the Prom. Aromatum, our Guardafui, in 6° N. lat., an error of 5° 48′ 50″ too far south, that well-known cape lying in 11° 48′ 50″. This misinformation touching a crucial station from which his departures down the East African coast are apparently calculated, would necessarily throw out his lower latitudes. Yet if the great water-parting be assumed to be at the head of the Marungu River, Ptolemy will have erred by only 2° 30′:—12° 30′ instead of 10° south. And as Dr. Beke has remarked, "The recondite Jesuit, Athanasius Archer, will be found right in substance if not in form, when stating, as he does in his 'Mundus Subterraneus' (vol. i. p. 72 *et seq.*), that in the Mountains of the Moon is the great Hydrophylacium of Africa, the central point of division between the waters flowing to the Mediterranean, to the Atlantic, and to the Indian Ocean."

Ptolemy also shows an Eastern lake in E. long. 65° and S. lat. 7°, and a Western in E. long. 57° and S. lat. 6°, which is nearly the centre of the Tanganyika Lake. It must not be forgotten that some geographers have represented Ptolemy's waters to be three: in one place (lib. iv. chap. 8) he speaks of them in the plural, *αἱ τοῦ Νειλου λίμναι;* in another (lib. iv. chap. 7) they are expressly stated to be two, *δυό λιμνῶν.* But this might refer to two largest in a Lake Region where for years every traveller will discover some fresh lacustrine feature. Well may Mr. Hogg—following D'Anville—conclude: "It must, therefore, be acknowledged that these accounts of Ptolemy, which relate to the upper portion of the Nile and to the reservoir lakes beyond the Equator, to the head-streams of that mighty river, and to a range of mountains termed 'of the Moon,' from whence descend as well as from whose roots spring the waters and sources that feed those central lakes, *are in the main correct.*" I believe Ptolemy's Niger to be not less exactly laid down than his Nile, and that he knew more about it than Europe did before the days of Richard Lander. And in confidence of his sagacity I cannot but believe the Tanganyika to be the Western lake-reservoir of Father Nile. The word "source" is expressly avoided, in the belief, with Mr. M'Queen, that a lake, unless it be a mere "eye" of water, cannot be taken as the head of a river, though the river may issue from it. "Lake Baikal is not the head of the Yenessei River, Lake Zana is not the head of the Blue Nile, Lake Geneva is not the head of the Rhone, Lake Lausanne is not the head of the Rhine, Lake Superior is not the head of the St. Lawrence, nor Lake Winnipeg the head of the Saskatchewan, and so of other rivers on this globe."*

I will now make a statement which to some may appear paradoxical, namely, that the real sources of the Nile—the "great

* See also Dr. Beke (*loc. cit.* p. 25).

Nile problem"—so far from being "settled for ever" by the late exploration, are thrown farther from discovery than before. They are not, we have been told, *in nubibus*, but they elude our vision. The exploratory labours of years, perhaps of a whole generation, must be lavished before even a rough survey of the southern Nilotic basin can treat the subject with approximate correctness of detail. "Mais les sources du Nil, sont-elles decouvertes?" enquires our fellow-labourer in the field of geographical science, M. V. A. Malte-Brun. "*Nous ne le croyons pas.*" No geographer does, no geographer can, believe in the actual "settlement" of the Nile sources. That the Tanganyika is the Western "top-head"—not source—of the Great Nile, and that the Bahari-Ngo, which supplies the Tubiri, is the Eastern, I have little doubt. But the Arcanum Magnum of Old-World Geography has not yet been solved. The old lines—

> "Arcanum natura caput non prodidit ulli;
> Nec licuit populis parvum te, Nile, videre,"

have lost none of their force: it still remains to this generation, as to its forefathers, "Caput quærere Nili"—to close the Canon of Geographical Discovery.

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II.—*Notes on a Journey to Kilima-ndjaro, made in Company of the* Baron VON DER DECKEN. By the late RICHARD THORNTON, Geologist to the Expedition; compiled from the Journals of the Author.*

*Read*, November 14, 1864.

THE narrative of Mr. Thornton, the scientific companion of the Baron von der Decken on his first journey to the snow-clad peaks of Kilima-ndjaro in 1861, commences with the departure of the expedition from Mombas on the East African coast. The party consisted of fifty-eight men, including the Baron, Mr. Thornton, Coralli (the Baron's valet), three leaders, five servants, and forty-seven carriers. Seven of the men were armed and paid by Mr. Thornton himself; one of them being a native of the Zambesi, named Sigwati, who had accompanied him since he had left the Livingstone expedition in that region.

Early in the morning of the 29th of June they commenced their march, and proceeded for the first two days, in straggling order, over the rugged hills and valleys which lead from the coast into the interior. The country was peopled by the Wanika and Wakamba tribes, and their numerous villages were mostly sur-

* See Map, Journal R. G. S., vol. xxxiv. p. 1.

rounded by stockades, showing the unsettled state of the neighbourhood. The huts of the Wakambas were of bee-hive shape, thatched with coarse grass, having the roots outwards. The men are slim in figure, and are accustomed to polish their naked skins with a mixture of red ochre and oil. They wear a great many ornaments, the most conspicuous of which is a broad coil of thick brass wire hung round the neck, nipping it tightly; and similar small coils fixed in the lobes of the ear. The front part of the head is shorn, but the hair at the back is twisted into tails and decorated with beads. The women wear a cloth shirt, rather full from the waist to the knees, and are adorned with brass and iron rings round the ankles, besides the coil of brass wire round the neck similar to that which the men wear.

After crossing the coast ranges, the party proceeded for five days over a gently undulating country, with tracts of grassy land and scattered patches of wood. Small herds of giraffes, antelopes, and ostriches now began to appear, but the march was continued without interruption until, after a long gentle ascent, they arrived at the country of the Wa-teita, a well-made but short and plump people, who occupy the healthy table-land from which the mountains named Killibassi and Kadiaro rear themselves. This district is not more than 60 miles, in a straight line, from the coast, and rather less than half way to Kilima-ndjaro.

The Wa-teita were armed with slender bows and leather quivers full of poisoned arrows, besides wooden spiked javelins and small swords. The women and children were covered with ornaments, brass collars and strings of beads round neck, wrists, waist and ankles.

The party remained amongst these savages for several days, it being a main object with the Baron to ascend Mount Kadiaro and take observations from the summit. Strong opposition, however, was offered to the project by the chiefs and people; and it was only after expending much in presents that one of the head men was induced to give the necessary permission and serve as guide. A goat was killed, and a favourable augury being obtained on an examination of its entrails, the party commenced the journey; Mr. Thornton taking with him the theodolite and boiling-point apparatus. The path at first was well trodden, and the soil of a bright red colour. After a short ascent they came to a nearly perpendicular face of bare rock, which they clambered up with difficulty, and then followed a very steep rugged path until their progress was stopped by a chief who said he was the owner of the hill, and stationed himself with a party of men in the middle of the path to stop them. After a long and tedious palaver the scruples of the chief were allayed and the party moved on. Other obstacles were placed in their way by the two chiefs, and at one

time they were near turning back altogether, but they finally reached the summit, the last part of the ascent being over highly-inclined surfaces of bare rock. A village of Wa-teita, governed by a third chief, and consisting of a few circular, half-rotten and dirty huts, was found perched in a nook a little below the highest peak. The summit was a very narrow, grassy ridge. The wind was cold and boisterous, and a heavy drizzling mist concealed from view all the surrounding country. According to observations taken, the height was 4130 feet, a much lower elevation than that estimated by the missionary traveller Rebmann, which was 6000 feet.

Three days after the ascent the Wa-teita showed signs of violent hostility to the party. The strife began by a body of natives seizing one of the men amidst furious demonstrations, yelling and brandishing their swords. The Baron and Mr. Thornton rushed out of the camp, rifles in hand, and rescued the man. This had the effect of bringing a larger number of the savages to the spot, armed with their poisoned arrows. They came down in bodies from the mountain, and on facing the Baron's party began chanting a war-song, pacing backwards and forwards in circles about the grassy undulating ground in front of the camp, and waving their swords in accompaniment to the chant. As more arrived they formed into three companies, each of which, in turn, advanced towards the camp in measured tread, made a hostile demonstration, and then wheeled round to the rear to repeat the manœuvre. Things now began to look serious, for some 200 of these enraged warriors were assembled; the Baron, Coralli, and Thornton were obliged to put themselves on guard outside the camp with their loaded rifles and revolvers, ready to fire if a single arrow should be discharged. As to their servants and carriers, they kept perfect neutrality, lying beside the fires inside the camp. Each company of natives was headed by a fighting chief, who led the chant which regulated their motions, and from the flanks a number of skirmishers rushed about, yelling, leaping and flinging themselves on the ground in great fury. After this had continued for a long time a parley was proposed, and it turned out that all this rage had been excited by the Baron and Thornton having made "uganga," or magic, on the top of the mountain. The "Waganga" (magicians) of the tribe were the most furious, and, on the Baron's refusing to pay a fine for his misdemeanor, again excited the warriors to threaten the party. One of them pretended to throw himself into a frenzy, foaming at the mouth and rushing on the party with his sword; but he was seized by his companions and dragged back. Finally the whole affair was arranged by a heavy payment and an exchange of presents. The warriors afterwards had a general fight amongst themselves.

On the 11th of July the party left this inhospitable country, and travelled for two days over a dry tract, destitute of water, to the S.S.W. of Mount Kadiaro. At twelve minutes past seven, on the morning of the 14th, Mr. Thornton had his first glimpse of Kilima-ndjaro, its cap of snow shining brightly about 2° above the horizon. After four days' march they arrived again at an inhabited district, the neighbourhood of the Paré Mountains. The natives here received them kindly and led them to a good camping-ground, selling them provisions in abundance.

The ceremony of blood-drinking was gone through with the chief, to seal the mutual friendship between the tribe and the strangers. The people were very different from the Teitas: they were lighter coloured, and did not shave the front of the head. Their swords and bows were longer, and their arrows had barbed heads. Each man carried a small black clay pipe, and many had leather bottles to contain snuff. The lobes of the ears were hung with large circular disks of ornamented wood. The women wore petticoats made of the skins of animals, and some were tattooed on the breast.

On the 19th they turned towards the north, passing over grassy plains and several dry watercourses. On the 20th they discovered a large sheet of water, called Lake Jipé. The southern margins formed a long grassy slope covered with bleached shells, both land and fresh-water. The waters were for a long distance concealed by a thick belt of reeds growing from a muddy soil, and swarming with waterfowl. After marching for several miles along the Eastern side they came to a place where the lake was visible, its waters rippled by a gentle breeze, and about three and a half miles wide. The total length of the water is about 20 miles, and the northern shores are fringed with gigantic papyrus, some of the plants 15 feet high. Herds of zebra and white rhinoceroses were occasionally seen, and the lower slopes of Kilima-ndjaro were in full view to the north-west.

On the 22nd of July they arrived at Daffeta, and were well received by the chief. The shields of the Daffeta people are made of buffalo-hide, and are 3 feet long by 18 inches wide, strengthened inside by a broad rib of wood, shaped to a neat handle in the middle. The Daffetas are great bee-masters; their bee-hives are hollow logs, about 4 or 5 feet long and 16 inches diameter, but thicker in the middle. They are planed smooth; a circular block of wood is fitted into each end, with a number of small notches cut round its edge for the entrance and exit of the bees, a projecting piece of wood being fixed outside for the bees to alight on.

On the 24th of July, Mr. Thornton, accompanied by guides given him by the chief of Daffeta, ascended a hill in the neighbourhood, 2118 feet high, and took a series of observations. The top

of Kilima-ndjaro, now 40 miles distant, shone out beautifully for a few minutes, showing streaks of snow along its ravines to nearly the base of its upper cone. Two days afterwards the party left for the village of Kilema, on the south-eastern slope of the great mountain. On the first day's march Mr. Thornton obtained another and still better view of Kilima-ndjaro, the whole of the snow-capped upper cone being distinctly visible. Many herds of elands and zebras were passed on the grassy plain which slopes up to the foot of the mountains.

The nature of the country began to change on the following day, when they reached the streams which flow from the southern slopes of Kilima-ndjaro. The ascent was steep and rocky, through dense woods, the river Goni flowing to the right of their line of march, through a deep valley.

On reaching the village of Kilema, which was surrounded by a moat 15 feet deep, fenced with a thick hedge, they were met by the leading men, each carrying a bunch of fresh grass in token of friendship. The people were in some instances of light-coloured skin: the young girls especially had a very pleasing appearance, many being lighter than half-castes, and having the hair shaved off on each side of their foreheads, which heightened the effect of their really fine, expressive features.

They were very scantily dressed, and some of the elder women wore thick pewter bracelets weighing 1½ lb. each, besides strings and belts of variously-coloured beads on different parts of their bodies. The boys and girls had, in some cases, iron rattles attached to their knees or ankles.

The chief of Kilema was at first profuse in his promises of assistance in the project of ascending Kilima-ndjaro, the highest peak of which was 20 miles distant from the village, over a mountainous country. He tried to dissuade the Baron from proceeding to Madjame, on the south-western slope, whence the ascent was as practicable as from Kilema, representing that the chief there had no power. The Baron promised a large present, and it was arranged that two guides should conduct them to the peak two days after the new moon, when the weather would be favourable. Several days were occupied in palavers and exchanges of presents, and Mr. Thornton profited by the time to take observations and study the customs of the people. One day he visited a native blacksmith, and watched the process of making an iron chain. The workmen drew out a fine wire and wound it round a thicker piece like a knitting-needle, afterwards cutting through the coils along the length of the needle with a small chisel, so that each separate coil made a little link when flattened. His forge was in a low shed, and his anvils consisted of blocks of smooth hard stone. The bellows were two long conical bags of leather sewn up on one

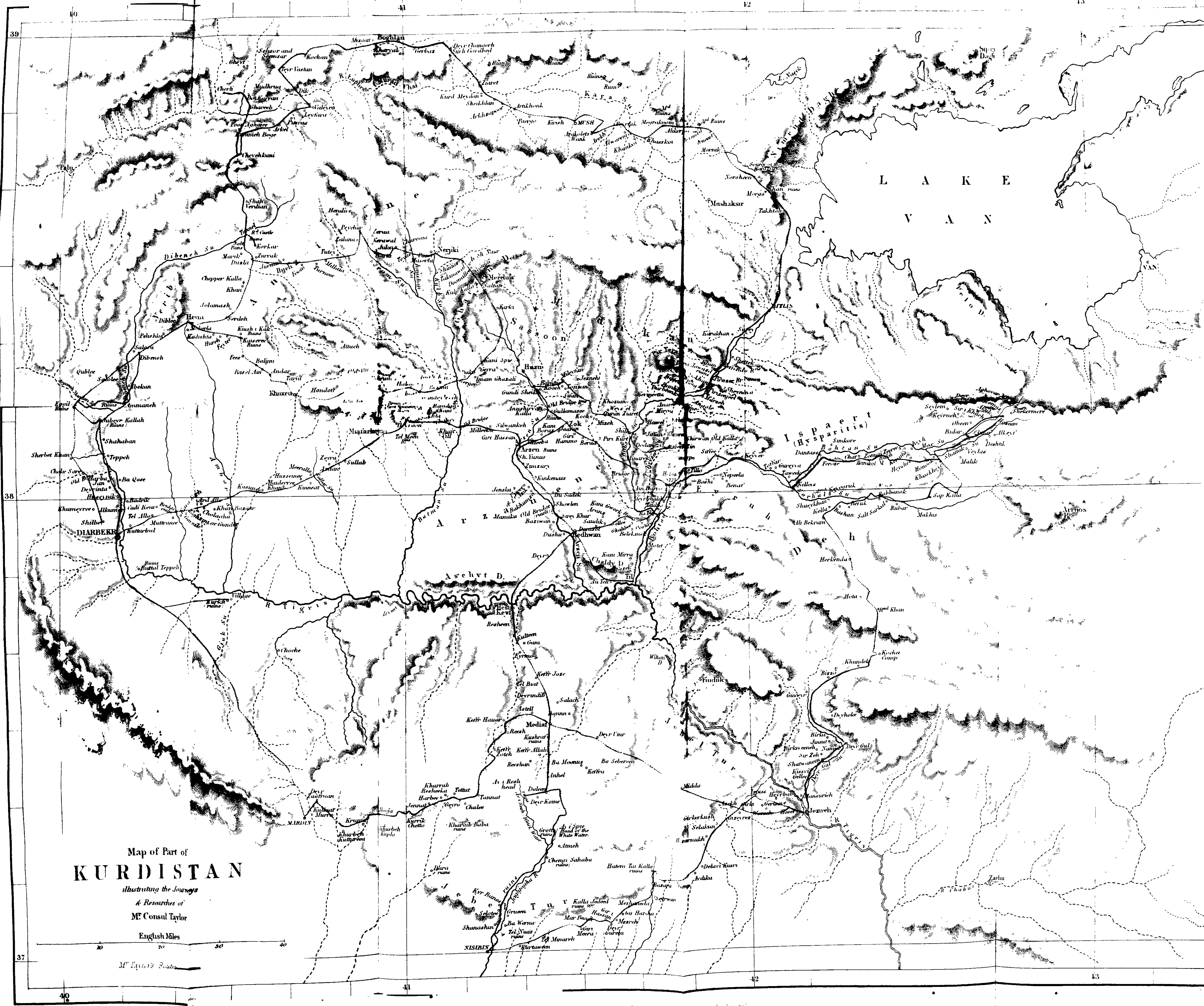
side, the air being collected into one stream by a hollowed forked branch of wood. One of his tools was a simple and ingenious kind of hand-vice, used for grasping the end of a wire when drawing it through the plates.

Another day he ascended a hill behind the village, an altitude of 4744 feet, the road to which led through plantations of bananas, which are very extensive over all the well-peopled lower slopes of Kilima-ndjaro. The upper part of the hill was covered with short fine grass. The view on the north and west was obscured by low clouds, but a fine sweep of country was beheld to the south, over a great plain through which flows the river Pangani between the Arusha and Ugono ranges. On the following day, ascending another hill, the atmosphere was much clearer to the west, and a huge plain was seen extending from the south-western foot of Kilima-ndjaro to a very high conical mountain, evidently a volcano, but without snow on its summit. This is called Mount Meru, and its elevation is upwards of 13,000 feet: it lies about 60 miles from the main peak of Kilima-ndjaro.

The Sultan of Kilema failed in all his promises, and the Baron, finding it impossible to ascend from this place, resolved to march to Madjame. The route taken was a detour through the uninhabited plain to the south of the mountains; this being chosen in order to avoid the numerous villages and chiefs which crowd the southern slopes.

On the second day of the march they passed through a rugged country clothed with dense forest, amidst frequent rains (although this was the height of the dry season); the undergrowth was of grass and ferns, and the trunks and branches of the trees were overgrown with parasitic plants dripping with moisture. Beautiful flowers peeped through the thick coating of greenery, and the path was encumbered with fallen and rotting trees. The country became more open in the plain through which they afterwards travelled until they again turned towards the hilly region on approaching Madjame. Kilima-ndjaro now became again visible, the first time was by moonlight on the 20th of August. The full-moon rose as the sun set, and a large snow-covered conical peak was seen to the W.N.W., nearly as high as the real top. Between the party and the snow-clad peaks rose a high, even range, cut through by several precipitous ravines; the snow was seen here descending much lower than on the eastern side.

The chief of Madjame turned out to be quite as ill-disposed to forward the views of the travellers as he of Kilema, and in addition to the usual difficulties the party had to contend with the trickery and evil influence of a sorcerer named Nassoro, who imputed "uganga" to the instruments which Mr. Thornton used on the tops of the hills. The greediness, caprice, superstitiousness and dis-


Map of Part of
KURDISTAN
illustrating the Journeys
& Researches of
Mr. Consul Taylor
English Miles
10 20 30 40
Mr. Taylor's Route
LAKE VAN
VAN
BITLIS
MUSH
Boghlan
DIARBEKR
MARDIN
NISIBIS
Jezireh
Mediat
Hesn Keyf
Redhwan
Arzen
Sassoon
Ispaert (Hysparitis)
R. Tigris
R. Euphrates
Kara Su
Bohtan Su
Batman Su
Dibeneh Su
Asehyt D.
Chaldy D.
Jebel Tur
Palu
Hevin
Khuzru
Mayafarkin
Zok
Tillo
Shirwan Old Kalla
Findok
Devr Gul
Zachu
Armos D.
Supan Dagh
L. Nazik
Mushaksar
Kochan
Korkar
Dibeneh
Shahuban
Chepper Kalla
Sherbet Khan
R. Chabur

honesty of the African character, seem to have been displayed here to a greater degree than anywhere else during the journey, and eventually the Baron and his party were obliged to leave (after wasting a large amount of property in presents), without being able to effect the objects of the journey. The nearest they could get was about 15 miles from the summit, and an altitude of 4867 feet: but they made numerous observations, sufficient to enable Mr. Thornton to sketch a tolerably accurate map of the group of mountains. The top of Kilima-ndjaro, from this side, appeared as a broad dome with a rugged, blunt peak on its north-west side of nearly the same height as the summit and sloping away gently for a long distance; behind the eastern slope rose the very ragged peaked top of the east peak. The snow showed beautifully on all these summits. The principal top had a good thick, smooth, coating of snow, with patches and streaks lower down, lying in ravines. Mr. Thornton calculated the height to be 22,814 feet. The Jagga range of mountains on the southern slopes were covered with dense sombre forests; their line of summits is somewhat regular and defined, but cut through by many deep ravines and narrow valleys. The Madjame side of the cone was very steep, and Mr. Thornton saw three snow-slips or avalanches gliding down the slope and creating clouds of snow-dust; but he saw nothing like a glacier. The rocks observed on the lower hills were vesicular, semiporphyritic lavas and other lavas of a spongy nature, showing the volcanic nature of these elevations.

The party left Madjame by stealth in the dead of the night of the 4th September, to escape being plundered by the chief, and, after a long detour to the south, arrived at Mombas on the 10th of October.

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III.—*Travels in Kurdistan, with Notices of the Sources of the Eastern and Western Tigris, and Ancient Ruins in their Neighbourhood.* By J. G. TAYLOR, Esq., H.B.M.'s Consul at Diarbekr.

*Read*, Jan. 9, 1865.

THE information contained in the following paper is the result of three journeys which I made in 1861-63, with the sanction of Her Majesty's Government, in the consular district of Diarbekr, the capital of the modern Pashalik of Kurdistan, and the seat of its Mushir or Governor-General. Originally undertaken for the purpose of obtaining reliable commercial and statistical data, I did not, nevertheless, neglect to note everything of geographical or historical interest, which either the reports of the natives or ancient authors had brought to my notice. Such information could not

fail to be novel and interesting, as although the country has often been visited by European travellers, they have, most unfortunately, though far more able than myself to illustrate what they saw, scarcely ever gone either to the right or to the left of the common highway, and therefore passed by without discovering many of the ancient ruins and sites described in the following memoir. Much of this interesting country—particularly the more mountainous part—remains still unexplored; but I trust at some future time to be able to complete a work which, under the circumstances, is at present unavoidably defective.

The province of Kurdistan, as it now exists, contains a great portion of the fourth Armenia, the whole of Arzanene, Zabdicene and Gordyena or Cordouene, and Northern Mesopotamia. With the exception of the latter, the general features of this tract are high mountains, enclosing fertile valleys, and an undulating upland, bounded on the east by the Tigris, and intersected at several points by numerous streams, having their rise in the mountainous districts of the Pashalik, and emptying themselves into that river. The scenery in the highlands yields to no other portions of Turkey for variety and romantic beauty, while the banks of the numerous rivers and streams flow through charming landscapes and thickly wooded valleys, bathing in their course the bases of castles and towns famous in profane and ecclesiastical history.

Previous to commencing a general survey of the province, I visited the interesting ruins of Kurkh, about 14 miles from Diarbekr. These ruins, occupying one end of a large alluvial plain teeming with the richest cultivation, consist of a high mound and a cluster of lower heaps about its base, situated at the eastern end of an elevated platform—evidently the site of a large town—on the right bank of the Tigris, and close to the angle formed by the junction of the Giuk Su with the former, which receives also the waters of the Ambar Su, on the left bank opposite. The large mound is the relic of an old Parthian fort, composed of large blocks of neatly-cut basalt; and, from the remains of mosaics and other ornamental vestiges found among the smaller mounds at its base, I fancy they formed portions of a palace that was connected with it. The fort is about a mile in circumference, and 60 to 80 feet high; the greater height and also the best preserved portions of building being towards the south; while on the northern and western sides it is lower, and the stonework there nearly all in ruins. At the north-west corner, near the summit of the mound, at a point where a bank of earth * had seemingly been thrown up outside the walls of the fort, I had the good fortune to discover a stone slab bearing

* In the Bible and Assyrian inscriptions, there is frequent mention made of similar banks of earth having been thrown up by the besieging forces as a means of facilitating the capture of a city.

the effigy of an Assyrian king, and covered on both sides with long inscriptions in the cuneiform character, to within 2½ feet of its base, which had purposely been left bare to admit of its being sunk erect in the ground, as a trophy commemorative of its capture by the king, and at the point probably where his legions effected their forced entry into the city. Some little way below it, on the slope of the mound, and nearly entirely concealed by *débris*, I exhumed another perfect relic of the same description. The head had been somewhat damaged by the attempts of some ignorant Moslem fanatics to sever it from the body, as they regard all statues and pictures of living things to be direct acts of gross impiety against the Deity, whose creative attribute has been sinfully assumed by the Kaffirs of a former age.

Sir H. Rawlinson identifies the site of Kurkh with that of Tooskan, alluded to in the inscription on the Great Monolith, exhumed by Mr. Layard, and described by him in the sixteenth chapter of his 'Nimroud and Babylon,' where distinct reference is made to these two tablets commemorative of the Assyrian King's campaigns and successes. He also, I believe, considers that it occupies the position of the old Parthian city of Carcathiocerta. About 6 miles from Kurkh, also on the right bank of the Tigris, is a curious ruin, called Poornag, or Poordad; and 6 miles higher up, on the left bank, in the centre of the highly cultivated valley of the Tigris, which begins close to Diarbekr, and stretches down to Kurkh, the ruins called Buttal Teppeh, consisting of a low mound with a high conical peak at its western end, similar in shape to, but smaller than the one at Nimroud. From all these ruins, and particularly after rains, numerous copper coins, principally Roman and Byzantine, are procured. I myself obtained two fine first bronzes of Trajan, with different and rare reverses from Kurkh, some Parthian coins, and an antique gold ear-ring, all in very good preservation.

In October, 1861, I made a short journey from Diarbekr to Saert, by Miafarkeyn, Arzen, and Zok; and from thence, following the course of the Bohtan Su, or Centritis, to Til, where it joins the Tigris, whose course I followed close up to Redhwan, on the Arzen Su. Crossing this latter river, I proceeded to Hesn Keyf, on the Tigris, and then, *viâ* Mediat and Mardin, back to Diarbekr. My route in the first instance led me along the foot of the hills bounding the great undulating plain north of Diarbekr, that stretches up to the Gharzan district to the north-east, and which is washed on the south side by the Tigris. The first point of interest was the old town of Miafarkeyn or Farkeyn, as it is more generally called by the natives. It is situated in the midst of gardens, at the foot of the hills, about 36 miles from Diarbekr. Two small streams of little depth, that have their rise

in copious springs close to the town walls, wash them on either side, and irrigate the rice-grounds and plantations. The town, wretched and miserable itself, is surrounded by a fine stone wall, and contains numerous relics of antiquity, but none of them seemingly older than the early Christian period.

It is, however, undoubtedly of far more ancient date, and the numerous isolated heaps and long low mounds probably cover ruins, much older than any at present visible above ground. The Armenian geographers (who also call it Nouphargerd and Mouphergin) place it on the Nymphæus; but Procopius,* with greater exactitude, says that the Nymphæus, the present Batman Su, runs close to it. According to a tradition still current among the natives, it was founded by Nouphar, a sister of Tigranes, the Haikian. Without attaching any weight to an idle tradition of an ignorant people, the fact of the existence of such a tradition is important, as determining the greater antiquity of the site. There is no doubt that a large, though a dilapidated town still existed here at the beginning of the fifth century, when it was restored by St. Marutha, an early bishop of the see, the ambassador of the younger Theodosius to Jezdegerd, the Persian King.† From the centre of the vile hovels that compose the modern town rise the stately ruins built by Marutha, where he transported and interred the relics of the martyrs who had suffered under Shapoor.‡

The building is solid, lofty, capacious, and (like the large church of St. James, at Nisibin) highly ornamented,—the capitals of the columns by a kind of basket-work of peculiar elegance, cut out of the solid blocks that compose them, and the interior by a broad belt, representing clusters of grapes and foliage. In one of the arched passages leading from the northern gate to the town is a long, though defaced, inscription in the character of the lower empire, and some isolated memorials of the same nature are met with outside, on the town walls. Miarfarkeyn, Maephracta, or Martyropolis, is situated in that portion of the fourth Armenia, called Sophene, Tzophanene, and Sophosene, and has by some geographers been identified as occupying the site of the ancient Carcathiocerta. Procopius alludes to it as the capital of the Sophosenes, and also mentions it under the name of Justinianopolis, after the Emperor who wrested it from Hormiodas, son of Chosroes, A.D. 589, and subsequently fortified the place.§ Alternately held

* 'De Bel. Persic.,' lib. i. cap. 21.

† 'Assem.,' vol. i. pp. 174-178; St. Martin ('Vies des Saints en Armen.',, vol. i. p. 96.

‡ St. Marutha was a grandson of Oda, a pagan high-priest of Mesopotamia. He obtained from Jezdegerd the alleviation of the Christian persecution, and persuaded him to make an alliance with Theodosius the Younger. (Tchamitch.)

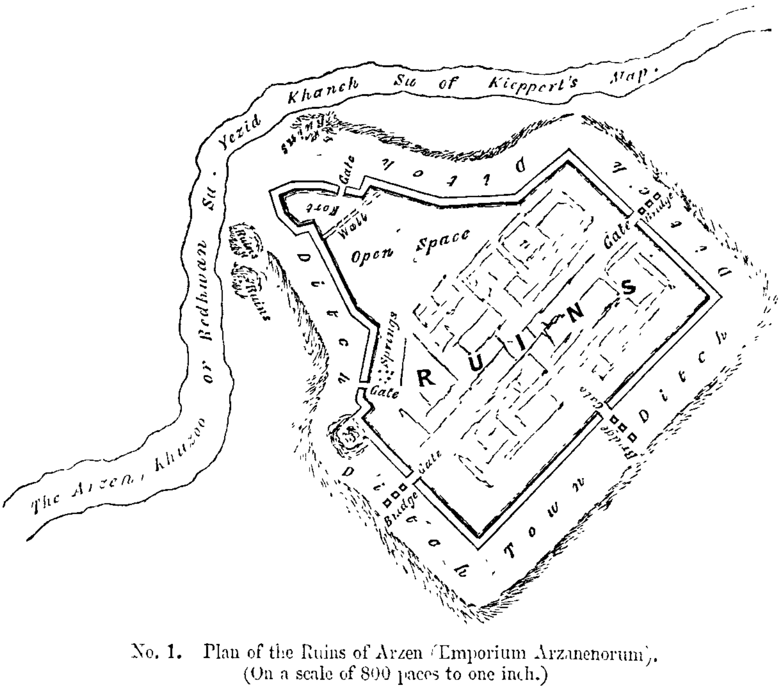
§ 'Procop. De Ædif.,' lib. iii. cap. 2.

by Romans and Persians, it reverted, during the califate of Omar, to the Arabs. One of his generals, Iyadh ebn Ghanem, captured the town by stratagem, although the Moslems delight in narrating that it came into their hands by supernatural means.* Subsequent to the Moslem domination, it was in the possession alternately of the Hamdanides, Kurdish Merwanides, Seljooks, Ortokides, and Eioobites, and it remained in the possession of the latter till conquered by Tamerlane from the reigning prince of the period. The Eioobites, under Modhuffer ed' Deen Ghazi, nephew of the great Sellah ed' Deen or Saladin, and the Melik el Auhed Nejm ed' Deen Eioob, did much to embellish and fortify the town. The former built a splendid mosque, bearing on the mihrab the date A.H. 624, the remains of which, with its beautifully carved windows and aisles, still exist; and the latter, according to the inscriptions still legible upon them, rebuilt the walls, and constructed a lofty watch-tower outside the town.

Close to Miafarkeyn, in a steep mountain-gorge, are the remains of the grot monastery of Hasoon, a corruption for Hosena. The grots are dug out of a steep and nearly inaccessible rock, that in consequence looks at a distance more like a rabbit-burrow than the former abode of men. Near them is an old church, which, according to an inscription inside it, was repaired A.D. 861. The caves are now inhabited by a lawless band of Kurds, the scourge of the neighbourhood; and in my rambles through them, I saw many vestiges of the results of their predatory excursions. In the plain opposite is a high conical mound, evidently artificial, called Tel Meen, commanding a fine view of the country about, with the Batman Su in the distance. On the top of it is a large Christian village, whose inhabitants informed me they often picked up copper and silver medals on it and in its vicinity. One of the latter, bearing on one side the effigies of Marc Anthony and his son, in very fine preservation, I purchased from among a handful of other coins that were offered me for sale. From here I reached the Batman Su or Nymphæus (in the time of Procopius the boundary between the Roman and Persian territories) in two hours, and crossed it by a fine bridge of a single arch 40 feet high. It consists properly of this one large pointed arch and two smaller arches, but the latter were dry; and the stream, which here is easily fordable, and at this season not 3 feet deep, flowed through the grand arch only. From the remains of an inscription on its eastern face, it was built A.D. 643 by a certain Othman: with the exception of the date, no other part of the record was legible. The Batman Su rises in the mountains about 40 miles north of this, and consists of the united waters of the Kulp,

* El Wakidi, فتوح دیار ربیع ودیاربکر.

Kaushan, and Sarum Sus, besides a host of smaller unimportant streams. Four hours and a half from this I crossed the Huzu Arzen, or Redhwan Su—it is called by all these names—into the present district of Gharzan. The province in which it is situated was called Arzanene by the Romans, and Artzn (Moses of Chorene), Aghdsnik, Aghdsen, and Khordsen by Armenian writers, and Arzen by the Arabs, since corrupted into its present name of Gharzan by the Kurds and Turks. It was one of the provinces taken by the Parthians from the Armenians, and was ceded A.D. 298 with Intilene, Zabdicene, Moxoene, and Cordouene, by Narses King of Persia to the Romans, under Galerius, in the time of Diocletian.*




No. 1. Plan of the Ruins of Arzen (Emporium Arzanenorum).
(On a scale of 800 paces to one inch.)

The ford was near the flourishing village of Giri Hassan, close to the ruins of Arzen,† the Oppidum Arzanenorum of Procopius,

* Gibbon, Bohn's Ed., vol. i. p. 448.

† The city of Arzen at the time of the Arab conquest was the property of the Armenian lord of Bitlis (El Wakidy Futooh Dia Rebia wa Diar Bekr), and was ceded by him to Iyadh Ebn Ghanem, Omer's general (ibid.). It subsequently fell, on the decline of the Abbasides, into the hands of the Kurd Merwânides, from whom it passed to a local family. Abul Feda (vol. iv. p. 366) says, "El Melik el Mudhuffer Ghazi, son of El Adel (brother of Saladin), took Arzen of Diarbekr from its lord, Hissam ed Deen, of the ancient family of El Ahdeb, who had

situated on the left bank of the river. The ruins are very extensive; the remains of the old walls, 20 feet thick at the base, and tapering up to 8 feet, constructed of irregular pieces of rough stone, cemented with mortar, that surround the town are easily traced; and the defences towards the river, consisting of thicker walls and a number of small-domed buildings, are in still better preservation. The area contained within them is about 2700 square yards. On the north-eastern and southern sides the walls are straight and regular, but towards the west it narrows off into an irregular shape that follows the course of the stream. It has four gates, one in each of the three regular walls, and a fourth leading to the river. At the southern side is a mound of ruin connected with the wall, that seems to have been a large fortified bastion. The whole ruin is surrounded by a deep ditch, which was crossed at three of the gates by as many bridges, whose foundations still appear above ground. When I visited it, the area included within the walls was bearing a fine crop of wheat, but the regular lines of the streets, and some of the sites of the larger buildings, could still be traced. So many medals in gold and silver are found here that the fellahs who till the ground are paid nothing by the owner for their labour, and they give him in addition half of everything they may find. The town was built on what appears a natural platform of some little elevation, which, at its western end, has a steep sharp fall into the plain about a mile from the walls, where it is bounded by a deep bed, through which a small marshy stream flows towards the Tigris, close under the Yezid village of Tellebeea, or Tileeba. Independently of other associations, Arzen is interesting as being connected with the earliest Christian history, it having been visited, according to Abul Furraj, the Syrian historian, by Mar Addæus, or Thaddeus, one of the Seventy, the apostle of the Syrian Chaldæans (and the same who cured Abgarus Uchama of his leprosy), in the thirtieth year of Our Saviour's Ascension, and the fifteenth of Tiberius Cæsar, who then built a church here, which was afterwards called by his name. Higher up the river, and on the same side as Arzen, are the remains of another large city, where I found some of the earliest records of the Moslem conquest, in the shape of tombstones, bearing Cufic inscriptions in the character peculiar to the first century of their era. Many of them are now used by the Armenians of Kani Masee, a small village situated at one end of the ruins, as gravestones. As neither they nor the Moslems knew anything of the characters on them, I thought it best to leave them in their ignorance, as without doubt the latter would soon

possessed it from Melik Shah's time, and gave him Heyni in exchange, A. H. 627." El Mudhuffer was at that time lord of Miafarkeyn.

have desecrated every grave in the place did they know that on each stone the formula of their faith, together with a verse from the Koran, were engraved. Opposite the ruins, on the right bank of the Arzen Su, which was formerly spanned at this part by a fine stone bridge, whose foundations peer above the stream, is the fine old ruin known now by the names of Kalla Sheikh Baj and Kalla Anushirvan. It is situated on a high hill of conglomerate, the usual rock formation here, having at its summit a circumference of $1\frac{1}{2}$ mile. The remains are evidently Parthian, and consist of walls of common limestone, 14 feet thick, which in some places is composed of brickwork of thin broad tiles of the same solidity. A couple of families of decayed Gharzan Begs inhabited some miserable huts among the ruins, and they had cleared several of the old houses, which served them for a stable. These were all of course now under ground, the *débris* of centuries having accumulated over and covered them. They were built in arches in a very substantial manner, and seemed at one time to have occupied the whole surface, as, in several pits that had been dug in different places, the portions of many other similar buildings were also discernible. On all sides but one the mound is nothing but a steep high cliff, commanding a fine uninterrupted view for many miles all round; but towards the west a winding and difficult path conducts the traveller to a large gateway still intact, and the only one in the ruin. A few greybeards of the place, who pretended to some traditional knowledge, informed me that the castle, during the times of ignorance—that is, before Islamism—belonged to the Beni Sassan; and stated that the Gharzan Begs, who live at Zok, 4 miles off, were the descendants of that dynasty in these parts; a fact that was corroborated to me by the Begs themselves on a subsequent visit I paid them. Near this is the mountainous district of Sassoon, inhabited by a warlike, unruly set of Kurds, called Baliki; they are neither Moslems, Christians, nor real Kizzilbash. They swear by a church, and never by a mosque, or the Deity, or any of the prophets.

After a great deal of intercourse with them in different places, I could not make more of their belief than what is expressed in the formula of faith which their headmen repeated to me in Turkish, word for word, thus:—"Bin yakhadan bash guesterdi choklari saaldi gumana Bir yakhadan bash guesterseyidee chokler gelerdi imaneh;" which translated is, "A thousand ways he showed himself, but many remained in doubt: if he should show himself in one way, a great many would come to the faith." And they explained it by saying, that all the prophets mentioned in the Torat, Enjeel, and Koran, were nothing more than one and the same person, who had appeared at different epochs in different forms. They thus ascribe divinity to all, though they forbear to

mention one name more reverently than the other. But, as they consider that the last shape he assumed was that of Ali, they attach more sanctity to his name than to Moses or Christ, while Mahomed they ignore entirely.

In this respect they are not unlike the Ali Illahees of Persia, and Kizzilbashes of other parts of Kurdistan, who seem to regard Ali as the personified deity, and holding, therefore, a much higher position than the Prophet of Islam. In the mountains near Kharput the American missionaries, with the praiseworthy zeal and perseverance under every trial, hardship, and persecution, that characterises them, have succeeded in imbuing them with a wish to study the Holy Scriptures; and, from their frequent request for native pastors to reside among and instruct them, it is probable that they are at last awakened to a sense of their errors and superstitions, and are anxious to forsake them for the Gospel truths. The wonderful influence exercised over them by the missionaries is exemplified from the mere fact that they, a mere handful of men from the New World, have been enabled to effect that which all previous dynasties and the present Turkish one, aided by its troops, have failed to do; for they have persuaded some of the most unruly and turbulent to lay down their arms, and abstain from rebellion, robbery, and murder, as being totally inconsistent with their teaching and the Holy Writ. But not only here, but throughout Turkey, wherever Protestantism, under American auspices, has been introduced, I have invariably found those professing that faith, in spite of their previous character and condition, to be the most loyal, peaceable, and industrious subjects the Sultan possesses.

The Baliki are the descendants of the early inhabitants of the mountains, who, according to them, had for their ancestors Sharezer, or Sanaser, as they call him, son of Sennacherib, who, with his brother Adrimalek, fled to this place after having murdered their father at Nineveh, and founded three dynasties, one of which was the Sanasouns, or Sassouns. The name of this district appears in several authors as that of Sanasounik, or Sasounk, corrupted subsequently into Sassoon. With reference to this region, the oldest Armenian author, Moses of Chorene, says that Sgaïorte, father of Barouir, the first Armenian king, and contemporary of Sardanapalus,* established Sanaser in the south-west of Armenia, near the confines of Assyria. His descendants peopled the mountain called Sim (Mount Saius†), and their chief obtained the government of

* 'Mos. Ch.,' vol. i. p. 95, translated by Florival.

† Dionysius, in his Chronicles, when talking of the irruption of the Huns into Syria (A.G. 706 = A.D. 395), says they destroyed all Syrian regions which lie at the foot of Mount Saius, as Arzen Maephracta, &c. It was also called the Mons Aridus. The Syrians called it the Tura Zahoto, meaning the "Arid Mount." It

the principality. From them descended the Ardznouni; and Kenouni-Charachan, of the same house of Sanaser, was at a later date created Grand Prince and Governor of the same country, receiving with it the canton of Artzen (Arzan) from Vagharchag (Valarsaces), brother of Arsaces, king of Armenia.* The inhabitants of Sassoon are, Moosee, Sarmee, Sassoon, and Baliki Kurds and Armenians, the latter being under subjection to the former. But the industry and trade of that part is entirely in the hands of the Armenians, who stand, with respect to the Kurds, in the position of serfs. Individual members of families, or a whole family, purchases the exclusive right of trading with particular towns from the chief, in return for a stipulated share of the profits, for which his family and goods are answerable. Thus, one man only can trade with Baghdad and in its produce; another with Constantinople and in its goods, and so on with every town throughout the Turkish empire; the same rule applying to all articles of export as well as import. Should an unauthorised interloper introduce himself for the purposes of trade into their country, he is either summarily despatched, or plundered of everything he possesses.

From Arzen a smart ride of 30 miles took me to Saert, during which I crossed the Bitlis Su at the 23rd mile, and the Kezzer, Keyzer or Sherivan Su (which falls into the Bitlis Su) at the 27th mile. Saert and Asaerd, the Mobadra of the Syrians,† although in itself a mean and wretched Kurdish town, is interesting from having been identified by D'Anville and Kinneir as the ancient Tigranocerta. It is situated at one end of a small plain on the slope of some high land separating it from the Bohtan Su or Eastern Tigris, from which it is 2 miles distant at the nearest part. The plain is considerably higher than the bed of the river, the descent to it being over a very steep road, about $1\frac{1}{2}$ mile long. A modern writer (Mr. Ainsworth), in combating the idea of Saert being Tigranocerta, adduces in proof that there are no ruins near it. There are certainly none visible above ground, but he probably was unaware that the whole of the town has been constructed from the remains of old buildings that have been exhumed from a depth of many feet below the soil. These ancient remains are always found when digging deep foundations for new buildings in the plain, but never on the slope of the hill upon which a portion

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is a part of Mount Masuis, which at different localities was known by different names. Also in the history of Armenia, by Vartabad Arisd. de Lasdiverd (translated by M. Prud'homme, they are called the inhabitants of Mount Sim, ordinarily called Sannaçounk, from the name of their ancestor. ('Revue de l'Orient,' tom. xvii. p. 8.)

* 'Mos. Ch.,' vol. i. p. 103; vol. ii. p. 145. Geog. of the Vartabed Vartan, in St. Martin, vol. ii. p. 431.

† 'Asseman,' vol. iii. p. 382.

of the modern town is built; and they extend for a distance of at least 3 miles, to a spot where some of them are nearer the surface, but which the natives say are the ruins of another and distinct town, called Arzoon. It is worthy of remark that in no other part of the Pashalik have I ever been able to find any coins of Tigranes, whereas here I bought in one day five of his medals, one of them bearing on its reverse a laureated Roman head; while other coins, Roman, Sassanian, Byzantine, and Cufic, are invariably met with in the excavations, as also a few cameos and finely-executed intaglios.

I would not have it inferred, from what has gone before, that Saert does actually represent the site of Tigranocerta, as both Tacitus and Strabo place it somewhere near the vicinity of Nisibin. The former says it is on the Nicephorius, 36 miles from Nisibin; and the latter places it south of Mount Masius, in the neighbourhood of that town,* and in the country of the Mygdonians.† These statements, if the general veracity of those authors is considered, are totally irreconcilable with the present position of Saert, or any place near it. Nor does the description of Tigranocerta, as we have it in Plutarch's account of Lucullus's campaign, coincide in the least with Saert; while the banks of the river are so rugged and steep that at present there is only one road leading to it, which a small number of men could easily defend against hostile thousands seeking to reach the plain from the river, even if composed of the tried legionaries of Lucullus. In the precincts of the modern town is a place known by the name of the Turrub-el-Yahood, or Jews' tombs. This fact is sufficiently curious as indicating the presence of a large Jewish colony here at some remote period, for at present there are no Jews in Saert, and none have resided here for ages.‡ At the point called Arzoon by the natives, 3 miles, as before stated, from Saert, is an old convent dedicated to Mar Yacoob el Habees—James the Hermit, the Ascetic of Endieli, near Amid—to whom (according to Procopius) the Persian monarch Cavades, or Cobad, granted a letter of protection, not only for himself, but also for all who chose to seek an asylum with him, when he was besieging Diarbekr.§ The Chaldæans say he is buried in the crypt of the convent, and point out two other places near it as containing the bodies of his two immediate disciples.

From Saert, pursuing the banks of the Bohtan Su, and passing

* 'Strabo,' lib. xi.

† Ibid., lib. xvi.

‡ Moses of Chorene tells us that Hyrcanus, high-priest and King of the Jews, was seized by Parzapran, the Armenian general, who sent him with many other Jewish captives to Tigranes, who ordered them to be sent to the town of Semiramis, the modern Van. Saert is on the direct road to it, 5 days off. ('Moses of Chorene,' vol. i. pp. 191-193.)

§ 'De Bel. Pers.,' lib. i. cap. 7.

the junction of the Bitlis Su and the Bohtan Su, about 10 miles below Saert, close to the village of Ba Til, I proceeded to Til, where it joins the Tigris. This village, situated upon a mound, in the angle formed by the junction of the two rivers, is built of the stone procured from some old massive buildings in the centre of the tumulus, portions of which are seen protruding from the ground all round its base, and for some way up the slope. I believe Mr. Ainsworth to be in error when he identifies (in his 'Researches') this village as the one of the same name where Tigranes transported the statue of Minerva.* The Til alluded to by Moses of Chorene was in the district of Egueghiatz, now Erzingan) in the province of Bardzer Haik,† which answers to the modern Tillo, on the north-west side of the large Mush plain.‡

Following the left bank of the Tigris upwards, a ride of four hours, during which I passed the point where the Arzen Su falls into the former, brought me to Redhwan, on the left bank of the latter river. The population of Redhwan, and the plain in which it is situated, although still extensively peopled by the Yezidees, was about twenty years ago nearly exclusively confined to people of that sect, who were always in a state of semi-rebellion against the government; but since the death of their chief, Meer Zig (a corruption of Meer Eshag), who was killed by the Turks, the country became more directly under their control, and they have consequently comparatively abandoned the place for Sinjar and the neighbourhood of Mosul. Crossing the river here I ascended the high hills beyond, and descended by a steep miserable goat-path, only practicable for mules, and which occupied one hour and a half in the descent, into the valley of the Tigris; and then, fording that river, reached the old grot town of Hesn el Kahef, or Hesn Keyf, in three hours and a half from Redhwan. The modern town is perched on the top of a steep and nearly inaccessible rock, having at the eastern end the old castle built by the Ortokides § on the ruins of a more ancient edifice. In a small plain at the foot of the mountains, that here press down upon the Tigris, are the ruins of the old town of the same name, the seat of the Orto-

* 'Moses of Chorene,' vol. i. p. 181.

† 'Mos. Ch.,' vol. i. p. 379.

‡ Notes to Matthew of Edessa 'Dulauriers Trans.,' p. 400.

§ The large room of the castle, now full of lumber, is built at the extreme end of this point, where the rock falls perpendicularly down to the bank of the river, the foundation-stones being let into the native stone. A single large window looks out over the old town in the plain, 800 feet below it, the grot habitations on either side, and the valley of the Tigris backed by the Redhwan range of hills

The castle was called the Josek (جوسك), a corruption for Kiushk, and was the favourite residence of Qutb ed'deen Suqman, the Ortokide Lord of Amid and Hesn Keyf. Abul Feda relates that he fell out of the window of the room described above, and was dashed to pieces in the plain below, A. H. 597 (Abu Feda 'Annals,' vol. iv. p. 192).

kides and of the Eioobites, with the remains of some fine old mosques and the burial-places of the later Eioobites, surrounded by neat walls of cut stone. A noble bridge of three large and three smaller pointed arches (similar in material to the one over the Batman Su), but now in ruins, spanned the river close under the town. Near the water's-edge, on two of the buttresses, which appear much older than the superstructure, are some reliefs representing male figures, of Parthian workmanship, about 3 feet high, and in good relief, but unfortunately, owing to fluvial action, much defaced. From the courtyard of the old castle, at the eastern end of the modern town, a curious covered way, containing a winding stair of 200 steps, is scooped out of the solid rock, leading down to the river. A little farther on are the remains of a similar stair, which, like the former, were evidently used by the townspeople to supply themselves with water from the Tigris. Where the stairs are at all exposed to the attack of an enemy from the opposite side, they are pitted with innumerable small holes, probably caused by flights of arrows that had been shot against these exposed parts, to prevent any communication with the river. Some 40 feet up the rock (west of the stair) is a large cave, with a lofty arched entrance, having on the right hand a mutilated figure, considerably larger than life, with outstretched arms, cut in high relief upon the stone. I had considerable difficulty in getting access to the cave, called Es' Sellamlik by the natives, but was not rewarded by anything I saw in the interior, although I had been informed an inscription was to be seen there. But by far the most interesting relics of the place are the myriads of grots, that stretch for 3 miles in one direction, and occupy the sides of six other separate ravines, scooped out of the hills to the east of and round the town. They exist, tier above tier, in parallel lines all up to the top, communicating with each other by stairs and by a zigzag narrow path, that, passing the door of each cell, reaches from the highest cave to the plain. In the same manner the water of some fine copious springs on the top of the hill was conducted by a narrow channel past each of them, and within easy reach of their inhabitants. With very few exceptions a monastic simplicity characterises them all; and, although some few had a large opening at one side, shaped like the common modern Aiwan, the majority had only a single opening (for entrance and egress) towards the plain and river. Each grot contained generally three deep recesses for couches, and two or three small niches for the reception of articles of every-day use. I was not lucky enough (notwithstanding the minute search I made in nearly all the caves on both sides of the river and in the different ravines) to discover any inscriptions or relics of importance, although Parthian, Greek, Roman, Byzantine, and Cufic coins were daily offered me in profusion.

Hesn Keyf or Hesn el Kahef is mentioned in Procopius as Ciphas,* and by the early Syrian writers as Keppa and Hesnet Keppa, all meaning the rock castle. Arab traditions say it was once called Sabbat Aghwal, or "The Seven Ravines," from the fact of the grots being dug out of the sides of seven different narrow ravines, which converge towards one common centre; and an early Arab author says it was called Hesn Loghur,† but that, at the time of its capture, it went by the name of its owner, Ta'un ebn Keifa.

An Armenian author, in his history relative to the first crusade, mentions Hesn Keyf under the name Harsenkev,‡ and says that after the defeat of Baldwin de Bourg, Count of Edessa, and Jocelyn de Courtnay, by Dejekermish and Soukman, which resulted in the capture of those two chiefs, Soukman ebn Artuq sent Jocelyn a prisoner to Hesn Keyf, while Baldwin was at the same time incarcerated at Mosul by Djekermish, the lord of that town.§ After being set at liberty in return for a considerable ransom, Jocelyn and his kinsman, Waleran (or William), were again captured by Noor ed' Douleh Balac, son of Behram, son of Artuq; and Baldwin, who with his nephew had flown to their rescue, was also defeated by the same chief, and shared their prison at Kharput.‖ Five months later a valiant band of Armenians of Behesni captured Kharput by a *coup de main*, and set the prisoners at liberty. Fearing that they would be unable to make good their retreat to their own territory through the enemy's country, they all remained in the castle but Jocelyn, who hastened away to bring a force sufficient effectually to release his friends and the numerous Christian captives—men and women—confined in the dungeons.¶ In the mean time Balak, having been apprised of the disaster, returned to Kharput, retook the castle by storm, and (with the exception of the royal captives, viz., Baldwin, his nephew, and Waleran) destroyed all his prisoners, consisting of 65 men and 80 "beautiful ladies," by throwing them over the battlements

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* 'Procop. De Bell. Pers.,' lib. ii.

† El Wakidi in his فتوح ديار ربيع وديار بكر.

‡ Injijian in his 'Geog.,' p. 234, says it was known to the ancient Armenians under the name of Kentzy.

§ 'Matthew of Eretz,' by Chahan de Cirbied, p. 48. 'Matthew of Edessa,' ch. clxxxii. pp. 254, 255.

‖ On this occasion the Moslems sewed up Jocelyn in a raw camel's hide, which, when it dried upon him, contracted to an extent as to leave him helpless, and so effectually prevented him making any use of his limbs (Ibn Athir, vol. x. p. 419). 'Matthew of Edessa,' chap. ccxxxiv.-v. 'Abul Feda,' vol. iii. p. 412. Kharput is called by the early Arab writers "Khurt Burt," which evidently means that it was built by the Parthians. the modern name is a corruption of the older one.

¶ Abul Feda says the chief defeated by Djekermish and Soukman was Sanjil (Raymond of Thoulouse, Count of St. Gilles), who was taken prisoner and sent to Mosul, A. D. 1103, vol. iii. p. 349, 'Annals.'

into the plain below.* Subsequently the Count Waleran, whom Ibn Athir describes as one of the infidel rebels (ن شباطن الكفار), and Baldwin's nephew, were put to death by Timour Tash, son of Ilghazi, nephew of Balak; and Baldwin was ransomed a second time by Jocelyn for 100,000 tahegans.†

Hesn Keyf is venerated by Moslems as being the burial-place of Yokinna, the renegade Aleppine, who in the first century of the Hejireh apostatised from his faith, and played subsequently an active part in the Moslem ranks against the Christians. He fell at the siege of this place; and the miserable ruins that cover his remains are yearly visited by the devout, who regard him as a martyr and a hero. A ride of two hours over a rugged mountain-road, first ascending and then descending, brought me into the Keffr Joze plain, with its fine cotton-fields and villages, and another hour and a half to the village itself. About 3 miles south-west of it is the artificial mound of Tel Biat. It is of some extent, and formed of the *débris* and remains of former buildings, which, I was told at Keffr Joze, yielded numerous medals and intaglios. This is the first portion of Jebel Tur, the Tur Abadeen of the Syrians, which, bounded on the west and south-west by Mesopotamia, and on the north-east and east by the Tigris, terminates at Jezireh on the right bank of the Tigris. Passing through the extensive ruins of the old town of Zaz, famous formerly for its monastery of the Holy Cross, and by Haa, I reached Deyrindib. The rock which rises steep at the back of the village is crowned by the ruins of an old castle—from the remnants about, and size of the blocks of stone that composed it, it does not seem of very ancient date. It had, however, evidently been built to make a good defence and stand long sieges, and the courtyard was honeycombed with cisterns that had been dug out of the native rock for receiving water. I reached Mediat (Modiad and Mediath of the Syrians) in two hours after leaving Deyrendib. The present town is a collection of miserable hovels, built of rough stone, and inhabited exclusively, with the exception of course of the Turkish officials, by Christians of the Jacobite persuasion. About ten minutes' walk from the town, a building containing a convent and medresseh, contrasts greatly, by its solidity and some pretensions to comfort and elegance, with the hovels tenanted by its supporters. The convent is dedicated to Abraham and Habel, and is built over a much older structure, bearing date—as the natives pretend, there being no record to commemorate the fact—A.D. 218; the same era nearly as the neighbouring convent of Deir

* 'Matthew of Edessa,' chap. ccxxxvi. pp. 308-10; 'Abul Feda Annals, vol. iii. p. 420, A.H. 517 = A.D. 1123.

† Ibid., vol. ccxli. pp. 312, 313.

Amr, dedicated to Michael and Gabriel, so ruthlessly sacked by Tamerlane. The Mediat convent formerly possessed a fine MS. library of Syrian authors and divines; but Bedr Khan Beg, in one of his numerous raids against the Christians of Jebbel Tur, plundered the place, and the monks still regret the loss of their literary treasures on that occasion. From Mediat, following the usual caravan route by Mardin, I returned to Diarbekr.

In the autumn of 1862 and 1863 I was again in the saddle, prosecuting the researches commenced the previous year.

The first point of interest visited was Eggil, eight hours from Diarbekr. It is built on a high, steep, rocky mountain, on the right bank of the Arganeh Maaden branch of the Tigris.* At its eastern end are the remains of a fine old castle with a double wall, communicating (as at Hesn Keyf) by a covered stair of 177 steps (cut out of the rock) with the Tigris. At the western end, the mass on which the Kalla is built, has been artificially separated from the parent mountain, so as to secure a complete isolation. A piece of the rock at this end juts out in a most conspicuous manner over the street, and on its face is the almost obliterated figure of an Assyrian king, with the traces of a long inscription in cuneiform (contained in a niche, 6 feet by 4), which, however, is so defaced as (though easily traceable) to be utterly illegible. Close under the castle, at a slight elevation from the river, another mass of rock has been separated from the mountain, and then fashioned into separate blocks connected at their base, 50 feet high and 24 feet square at bottom, tapering up to 8 feet square, each containing a grot surrounded by a bell-shaped or rather conical top, very similar in shape and style to the curious roofs of the old churches throughout Armenia, which were copied in a modified form by the constructors of the Mahomedan Turbehs at Ikhlat and elsewhere. They are all of them ancient burial-places, full of bones, pieces of wooden coffins joined together by wooden pegs, and the fragments of long-necked bottles composed of a thin kind of glass. On the pedestals of several of the tombs rude human figures in high relief were cut on the stone, but their mutilated condition prevented me from being able to form any idea of the age to which they belonged. In a ravine that runs round the southern side of the mountain, as also on the left bank of the river, were numerous other grots of the commoner sorts, none of them being of the same nature or size as those I have described, although all had been prepared with more care and attempt at ornament than is usual elsewhere.

* Kiepert, in his large map, has placed it on the left bank of the Tigris, and below the junction of the Maaden and Dibeneh rivers.

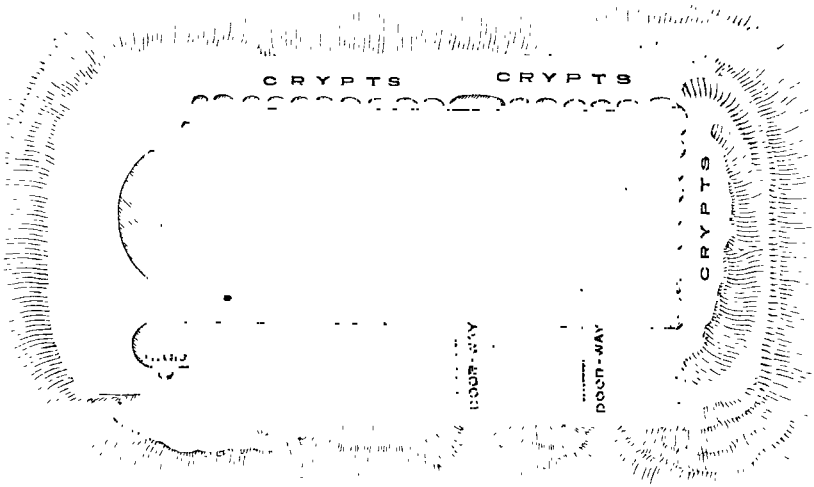
This town was called by the Syrians Agyl or Angyl, and the district, which was known to the ancient Armenians by the name of Ankegh,* was the same as that called Inghilene by the Greeks. Assemanus tells us it was also called Anchialus, and that it was plundered A.D. 503, in the reign of Anastasius, by the Persian King Cobad.†

Three and a half hours from Eggil, and on the right bank of the Tigris, some way below the junction of the Maaden and Dibeneh branches, are the ruins of Jubeyr Castle, situated on the top of a mass of perpendicular rock that crops out of the summit of a high hill, a spur of the mountain-range there. The southern portion, on which the Kalla is built, has been separated, as at Eggil, by a deep and broad cutting, 120 feet long, 60 deep, and 50 wide at its weakest point from the main range, so as to have ensured it against any sudden capture by escalade. This point was further fortified by a huge mass of solid brickwork, rising to a height of many feet, which, subsequently, in the shape of a wall, follows the irregularity of the whole summit of the mound, enclosing an area of 400 yards long, with a breadth varying from 20 to 40. Higher up the stream, at the angle formed by the junction of the Arganeh Maaden and Dibeneh Sus, which form the western Tigris, are the ruins of Ammaneh Castle, occupying, as at Jubeyr, the top of an isolated mountain, but its position is incomparably stronger, from its greater height and comparative inaccessibility. It can be approached only at one side by a single path, hardly practicable for mules, the other two sides being high perpendicular rocks, washed respectively by the Dibeneh and Maaden rivers, the weakest portion deriving additional strength from walls of amazing thickness. The area of the summit is about 1½ mile long, and 1 broad, and the whole, with the exception of a small portion of the southern end, is choked by the *débris* of old houses and reservoirs of black stone. On the north-eastern side of the mountain a covered stair cut out of the solid rock, as at Eggil, 280 feet high and 8 feet broad, leads down to the Dibeneh Su. The site, its impregnability, and extensive remains coincide, more than any other position or ruin I have seen, with that of Carcathiocerta, which has been placed alternately at Miafarkeyn and Diarbekr.

First following the Dibeneh Su, and then ascending the upland, whose base it washes, I crossed to Heyni, visiting on my way the curious grot church, close to the fine Armenian Village of Dibeneh, which is scooped out of a mass of isolated rock on the left bank of the river of the same name. This place, from the numerous small crypts round its interior, is called by the

* 'Moses of Chorene,' vol. i. pp. 105-161. † 'Assemman.,' lib. i. p. 273.

Moslems Elakhoor or Stable; but whatever it may be now, its original use cannot be mistaken, and it is in consequence venerated by all Armenians as the earliest temple of their faith. The church




No. 2. Plan of Grot Church (8 feet high), near Dibench. (Scale 20 feet to 1 inch.)

is entered by two wide, low doorways, and is capable of containing a congregation of 200 people with ease. The place where the altar stood is a commodious arched recess, approached by three steps, and communicating on the left with a small room, for the convenience of the priest and others connected with the church.

In its immediate neighbourhood there are several other grots cut out of the rock, which, from the stone benches in them, and other marks and remains, appear to have formed dwelling-places for the inferior church officials. The natives told me that human remains were in such abundance all round the precincts of the church, that, for fear of desecrating them, they had forborne to till the ground about it, lest they should unwittingly exhume the relics of those they regard as their ancestors. For the same reason they have turned the course of a small stream, that formerly washed the rock into the plain.

The road from Dibeneh to Heyni runs part of the way through the beautiful valley of Pelishka and close to the low range of hills that bound the valley of Nerib at this side. The name of Nerib is curious as occurring in the great monolith inscription alluded to further back, in connexion with the march of the Assyrian King from that place to Tooskan or Kurkh, 14 hours (35 miles) distant. The great King reduced its unruly inhabitants to obedience, and destroyed their cities and strongholds. Now, as then, it is

inhabited by a set of Kurds (always in rebellion), living in their secluded and inaccessible valley, which still contains several ruins of very ancient date. Nerib is also the first point where the Zaza Kurdish is used, the Kermanji dialect being the one spoken in all Eastern and Southern Kurdistan.

Heyni, or Hani, is a pretty little town situated on the slope of a hill crowned by the ruins of an ancient castle. Some old Mahomedan buildings and an ancient square watch-tower, in the middle of the luxuriant gardens at the foot of the town, boast of great architectural beauty. One of the former, dedicated to a certain Zeineb (not the famous one), is built in the form of a cross, and has the Ayet el Kursee carved in beautiful letters all round the interior of the building. In the centre of the town a large spring, 200 feet in circumference, enclosed by masonry, supplies the town gardens and splendid clover-fields with beautiful clear cold water; it then emerges into the plain and forms the river called Ambar Su, which falls into the Tigris opposite Kurkh, as already noticed further back.

A ride of three hours by the villages of Feyter and Ooreh, or Hureh, from Heyni, took me to the interesting ruins called Kuishk i Kak and Afisios Daknaoos, situated to the south of east of Heyni, on the top of a mountain-range separating the Lijeh from the Diarbekr plain. The remains are of the most solid construction, consisting of a series of arched rooms, and a little higher up of a temple, with several fragments of columns scattered about it. A magnificent uninterrupted view of the Sileywan, Lijeh, and Diarbekr plains is obtained from this spot, the eye ranging alternately over them, and long belts of thickly-wooded mountains. Our descent to the small plain beyond was through a mass of ruins that covered the slopes of the hill for a space of one mile, fragments of thick walls and neatly-cut blocks of stone were strewed over the road and impeded our progress, the remains of the old City of Fees (Phison of Procopius).* A small village near them is also called Fees, Affis and Afisios. The inhabitants have a tradition that the ruins, and a small cave near it, was the spot tenanted by the Seven Sleepers and their canine guard, the Kelb i Kehef. The scene of this legend is generally reported to have taken place at Ephesus, near Smyrna; and here, curious enough, I procured several small silver coins with the ancient type of Ephesus—the bee on one side and the stag and palm-tree on the other; and I was informed that numerous coins, principally copper, which were always thrown away as having no value, were found among the ruins. Close to them, but on the Lijeh plain, are the ruins of Attakh or Hatakh, situated in the old province of Terjan, now

* 'De Bello Persico,' lib. ii. cap. 24.

called Tarjil. This town is also mentioned by Procopius under the name of Attachä.* From here (still going south of east), passing the old ruins and convent of Tarjil or Terjan, and the town of Khuzru,† a beautiful ride took us to the lovely and fruitful valley of Halda.

During our ride to it we passed the villages of Ras el Ain, Andar, Khodik, Hondoff, and Meherani; our road being along an elevated ridge, with two charming well-cultivated valleys on either side of us. Meherani was situated on the extreme edge of the ridge, where it is bounded by a steep rocky mountain, on one of whose peaks the ruins of the old Meherani Castle frown down upon the smiling plains at its feet.

At the western end of Halda or Sawerz Valley was situated, on a high mountain peak, forming the end of a spur from the main ridge, which here runs into the valley, the castle of my friend Reshid Aga, the local chief. Opposite to it, on the eastern end, was a similar peak, three miles off, upon which are the remains of a very ancient strong fort called Boshat. The walls and stone composing them are of great thickness, and, as usual, the court-yard was regularly burrowed with large and small reservoirs for water. The Arabs, however, seem to have captured it without much difficulty, as well as the castle of Arshat (Halda) in its immediate vicinity.‡ At the base of the rock on which it is built there is a fine and spirited representation, in very high relief, of a Parthian warrior on horseback, and behind him another figure, but of a totally different type, with the hands bound and held up in a supplicating attitude, somewhat larger than life. The warrior's head has been much disfigured, but everything else, even to the shape of his clothes and armour, is remarkably well preserved. Beneath the figure is a large empty grot with a narrow doorway. Excepting in Arabic authors, I find no clue whatever to the old castle of Boshat; but the name of Halda seems to have originated in that of the Armenian divinity Haldia, the god of Ursa, King of Armenia, mentioned in the Van inscriptions, and in the great inscription of the Palace at Khorsabad.§

On emerging from the valley, the road debouches into the Ghazalee plain, on the right bank of the Batman Su. The road lies through a narrow gorge, which on the right hand has two high rugged rocks called by the natives the ruins of Bukht Nusser's

* 'De Bello Persico,' lib. i. cap. 31.

† The name of "Khuzru," and that of the neighbouring district of "Khuzu," situated as they are, near the sources of one of the affluents of the Tigris, are suggestive of the Khuzirina of the Assyrians.—See Professor Rawlinson's 'Monarchies,' vol. ii. p. 258.

‡ El Wakidi in his فتوح ديار ربيع وديار بكر.

§ 'Journal Asiatique,' Sixme. Serie, tome i. pp. 14, 15.

Castle. Enticed by the name, I clambered up with some difficulty to the top, but saw nothing more than a confused heap of stones. All about this neighbourhood are numerous sacred groves; the largest were called Derees Jimishar and Pir i Bad, the other names were Mahomedan, consisting for the most part of stunted oak and a species of poplar, with long, narrow, spear-like leaves which tremble and quiver with the slightest breath of air. These groves each bear the name of some pretended Mahomedan saint; but their presumed sanctity is more ancient than the era of the Islam conquest, and dates probably from the time when the Armenians had such groves, and adored certain kinds of trees, one of which, the Sos (plane-tree), was particularly the object of their veneration.* Three hours east of Halda I forded the Batman Su, at Bashkaia village, not far from Zodeeb ruins, and then turned round, first north, and then west to Duzla (eight hours from Heyni), crossing on my journey all the head waters forming the Batman Su, called by the natives the Kulp, Kaushan, and Sarum Sus.† At Duzla I was again near the Dibeneh Su, and, striking across the country till I reached it, followed its course to the source, a distance of nine miles from this. About three miles below the sources the river enters a high cave, 80 feet high and two miles long, running north-east and south-west, and emerges from it near the village of Korkhar, at a point where the rocks are smooth and hard. Here, just outside the cave, on the right bank, and some twenty feet up the face of the rock, is the figure of an Assyrian king, with ten lines of a cuneiform inscription, in excellent preservation. Further inside the cave, but on an uneven and misshapen part of the rock, is another figure and inscription, but unfortunately, owing to the irregularities of the surface and other causes, in a nearly illegible state.‡ During

* 'Moses of Chorene,' vol. i. cap. 20, p. 95.

† At Millaia village, about 14 miles from Duzla, is a curious subterranean church. Entrance to it was obtained by a flight of steps in the courtyard of our Christian host's house. It is of great antiquity, and is dedicated to Mart Shamoon and her seven children, who suffered martyrdom under Antiochus Epiphanes, B.C. 174, for refusing to eat hogs' flesh at his order. The event is recorded to have taken place at the village of Susandra in Judea. A rude daub representing Antiochus with his radiated crown sitting on a throne, and the mother and her children before him, is hung up over the high altar, and commemorates the fact.

‡ Sir H. Rawlinson says one inscription and figure is that of Tiglath Pileser, B.C. 1110, and the other that of Ashur Izir Pal, B.C. 880, the King of the Nimroud Monolith. See Professor Rawlinson's 'Ancient Monarchies.' The inscription, as translated by Sir H. Rawlinson, is "By the grace of Asshur, Shamas and Iva the great gods, I Tiglath Pileser, King of Assyria, son of Asshur-ris-illim, King of Assyria, who was the son of Mutaggil-Nebo, King of Assyria, marching from the great sea of Akhiri (the Mediterranean) to the sea of Nairi (Lake Van), for the third time have invaded the country of Nairi." This monument exhibits the earliest Assyrian sculpture known to exist, and is mentioned by Asshur-idanni-pal, the father of the black obelisk king, in his great inscription.—Professor Rawlinson's 'Monarchies,' vol. ii. p. 331.

the spring floods, the river, confined in a narrow gorge with high perpendicular cliffs, comes down with immense force; the north-east end of the cave is naturally, therefore, a mass of fallen rock and smaller fragments; so, if at any time another inscription existed there, it must from these causes have disappeared long ago. I am inclined to believe that from the numerous *débris* which now choke the stream, and the cave-like appearance through which it runs, this subterranean channel of the Tigris, or Dibeneh Su, extended close up to its sources, and thus gave some countenance to the fabulous length of its underground course as mentioned by Strabo. The cave to the south-east ends close to the first inscription, but a few yards farther on the river passes through another high natural arch before it enters upon its course through the plain. A few hundred yards from this point it has again fallen in, and the remains of an old bridge composed of cut stone let into the natural rock are visible on both sides of, but high up, the cliff. At one side of the cave, but perched up on the top of the mountain it has pierced, are the ruins of a small ancient fort. From it a flight of narrow steep steps, cut out of the face of the rock, leads down to a shelf, from which, entering by a narrow doorway, another stair, tunnelled in the solid stone, conducts to an opening in the roof of the cave, at a considerable height, however, from the water, which, as there is no reason to believe that the stair was intended for anything else than as a means of supplying the garrison of the fort with water, must have been obtained by a bucket and rope. At the base of the hill is a small level spot, round the edges of which are the remains of old buildings and a dilapidated arch. The country a little beyond this is called Dhu'l Karneyn, but in old Arab authors the Castle alone, the position of which is accurately described therein, is mentioned by that name.*

The early Arab geographers seem to have been perfectly aware of this source of the Tigris, which they regarded as the main branch, and described it as being north of Miafarkeyn, and close to the castle of Dhul Karneyn.† Near it is an immense stalactite cave, called Bakireyn, with innumerable passages branching off in every direction: the natives say it extends to Erzerum. Accompanied by a large party of Kurds, with torches and candles, I followed the main passage for about one hour, and was then forced to return without finding an opening at the other end.

The fanciful imagination of the Kurds had induced them to believe that the fantastic shapes of the stalactites were representa-

* El Wakidi, Futooh Diar Rebia wa Diar Bekr, Abul Feda, Taqweem ul Buldan.

† Abul Feda Taqweem ul Buldan, and see also El Kahramani in his MS. entitled كتاب اخبار الدول واثار الاول.

tions of men and beasts, idols of an earlier age; and they thought my visit to a spot which they all avoid was a pilgrimage to the Pantheon of heathen ancestors.

This part of the Diarbekr Pashalik was a few years ago known by the name of Khanchoot, a corruption of the old name of Handsith,* called by the Armenians Andsda, by the Syrians Hanzyth and Anzyth, and by the Greeks of the middle ages Kanzit,† and is probably the Anzetene of Ptolemy,‡ one of the eight provinces composing the Fourth Armenia. From here a mountainous road conducted me to the purely Kurdish districts of Genj, Zigtee, Yehki, and Taoos; then crossing the Euphrates or Murad Su, at the Armenian Village of "Dyk" or "Tyg," I went through the Tchabakchoor plain, following the course of the Goonik Su and the fruitful Boghlan Valley; then across the hills to the old convent of Surh Garabed. I found the whole fraternity hopelessly involved in clerical squabbles, which they attributed to the advanced views of their bishop. I learnt subsequently that the prelate, who was a very enlightened and well-read man, had, disgusted at the levity and open profligacy of the priests, attempted to reform their character and curtail amusements scandalous to their cloth, and, at the same time, to introduce a better and more liberal system of education among the *élèves* for the priesthood than then existed. His views displeased the old bigots about him, who soon after procured his recall to Constantinople, on the pretence of his having favoured Protestantism.

From Changerli, as this convent is also called, I descended into the plain of Mush, and not far from that town visited the site of Khoren or Khorni, the birthplace of the famous Moses of Chorene, the disciple and friend of Saint Mesrob, the inventor of the Armenian alphabet, in the fifth century. Khoren is situated in the ravine at the foot of the mountain, on whose slope is the famous Armenian monastery of Arakolets Vank. The latter I found tenanted by an old greybeard bishop, who, it appeared to me, from an elaborately painted snuff-box of Parisian make (he had at his side), had not quite given up a desire for worldly pleasures. He had just arrived at the place, after a long exile in an out-of-the-way convent, as a punishment for having formerly indulged too ostentatiously in secular practices, which even among men of the world might be termed vicious. All around seemed falling into inevitable decay; the rooms were bare and wretched, and the old bishop had to content himself with the humble cigarette, instead of the jewelled chibook of former days. In the church I saw a fine old manuscript copy of the New Testament in Armenian, written on vellum, and also an elaborately-carved ebony door,

* Ibn el Athir. † Abul Furruj. ‡ Geog. lib. v. cap. 13.

which, I was informed, had been sent many centuries ago from India, as a votive offering to the church. It bore a well-executed carving of a procession of horse and foot, elephants and tigers in high relief, sufficiently curious in itself as the gift of a remote Armenian colony; it was more so as showing the ancient costume of that fallen nation, and the kind of armour worn by the valiant soldiers of Sempad, one of whose numerous expeditions it purported to represent.

From here, crossing the Kara Su—I had previously forded the Murad, into which it flows—I proceeded to Treymerd, an Armenian village at the eastern end of the fine Mush plain. At the back of the village is an ancient mound, with an old church on it, built of large blocks of black stone, and surrounded by broken columns and graves, with enormous headstones of the same material, carved with crosses, flowers, and inscriptions, in the old Armenian. In hunting about these remains I discovered three fragments of a large pyramidal stone, bearing on both sides a sharply-cut inscription in the Van cuneiform. Several pieces were wanting, and the larger one I had found was, in addition, much mutilated by a large round hole that had been scooped out of its centre, in order to form one of the rude mills formerly in use among the villagers. This piece, when I discovered it, was doing duty as a headstone for the grave of a defunct ecclesiastic. An old Armenian priest, who pretended to more historical knowledge than most of his cloth, informed me that in a book in his possession, the 'Ashkharatsuts,' it was stated, that during the times of the idol-worship, three brothers came from the vicinity of Baghdad, called Mushiak, Tameyder, and Ospenik. The first founded Mush, the second Treymerd, and the third, Ospenik Kalla, near Sekhano, in the plain.

I find some corroboration of this legend in an interesting article by Mons. J. B. Emin, of Moscow (translated by M. A. de Stadler), who, however, only mentions two brothers, named Kisane and Temedr, whom he represents as coming from India, and as having been established by Valarsaces, 150 years B.C., in the province of Daron (Mush).* On the western side of the Mush plain there are five other mounds, equidistant from each other, and two of them of some extent, all of them marking very ancient sites. Not far from this, in the Khunnus district, is the village of Haramyk, tenanted by a primitive set of Armenians, who professed a faith similar to Protestantism. They were known to the old Armenians as the Thontracites, from the village of Thontrag, the residence of their founder, and had their rise in A.D. 840.†

* 'Revue de l'Orient,' tome xviii., sur la 'Paganisme Armenien,' p. 217.
† 'Revue de l'Orient,' tome xvii.; Lasdiverd's 'Hist. of Armenia,' pp. 9-21.

In spite of the most dreadful persecutions, they still managed to hold their own till within the last few years, when most of those that remained in the old faith joined the Presbyterian American Church. I was informed that some of them who had emigrated to the Russian territory, near Gumri, still clung to their old faith, and that they used a Prayer-book called the 'Panalee Jismardutyan,' or Key of Truth; but others said it was taken away from them by their Russian masters.

Proceeding along the south-eastern side of the Mush plain, a march of 3½ hours brought me to the head of the Kara Su River,* one of the numerous streams that fall into the Murad or Euphrates. The water was welling out of a large circular fathomless hole of volcanic origin, having a circumference of 100 feet, situated in the middle of the plain. The effect of the water perpetually overflowing the crater, without the slightest effort or bubble of any kind, was very remarkable, as it seemed hardly possible that the numerous brawling streams that it supplied could owe their origin to this unruffled and apparently motionless reservoir. Close by was a Turbeh, in the Ikhlat style, of a certain Qarabedani Agha, bearing the date of Ramadhan, 5th A.H. 687. From here, by the usual caravan road, I reached Bitlis in five hours. After a few days' rest I again proceeded on my journey, following the banks of the Bitlis Su, through magnificent scenery, but over a wretched track in confined passes to within a few hours of Saert, when I diverged from the main road, close to the ruined Kalla of Durbeen, in a southerly direction, to the Village of Deyr Zin, a corruption for Deyr Azinar, so called from the remains of an old castle of that name, built on the top of one of the highest mountain-peaks in the neighbourhood. The view from the keep was most magnificent: on two sides was a confused heap of steep mountains, and on the others the Shirwan and Ispaert uplands, and Gharzan and Sileywan plains. From Deyr Zin my road lay through a charming country and scenery, west to Minarch, and then north-west by Weys el Quran and Mileyfan, famous for its salt-works, to Huzu or Khuzu, the capital of the Sassoon district, and the seat of its Mudir. Huzu, or, as it is also called, Khuzu, is a tolerable town for Kurdistan, built upon one end of the mountain-range that bounds the Gharzon or Arzen Valley, intersected by the Huzu Arzen or Redhwan Su, which, not far from this point, breaks through the mountains and debouches into the plain. At one side of the town is a mass of nearly perpendicular rock, situated on the edge of a deep ravine, through which a small

* The main branch of the Euphrates that flows near Erzerum is also called the Kara Su, and must not be confounded with this one.

branch of the Huzu Su flows.* On the top of this rock are the remains of a modern fort with old foundations, and down one side a long belt of rock, containing a regular series of small grots, equidistant from each other about 10 feet from the ground; one at the back of the ruins is more extensive, and double, the outer grot being 4 feet by 6, and the inner one 6 feet by 10. Two miles from this, in the bed of the ravine, is the ancient Armenian convent of Nor Sheen, or Nor Shiragan. It is dedicated to the holy cross, and contains a substantial portion of the cross-beam to which the faithful in such relics attach supernatural qualities. The dissolute old bishop who presides over the establishment, and who looked more like a brigand than a priest, told me that it was built 1400 years ago, and that its sanctity was so great that thousands flocked to it yearly from Russia, Syria, and Armenia. Numerous small streams coming from the Sassoon and Moodikan mountains commingle a few miles above the convent, and their united waters form the river before mentioned, and which is noted in Kiepert's Map as the Yezid Khaneh Su. The ruins of an old bridge, bearing an inscription 800 years old, chokes the stream close to the village; and near it are several excavations made by the natives in search of salt, which is procured in large slabs about an inch thick, singularly pure, and having the appearance of opaque crystal.

Retracing a former journey by Zok and Arzen, I reached Redhwan, following the course of its river.

Two hours before reaching Redhwan, close to the ruins of Mamika Castle and the ruined Ziaret of Sholeen, on the right and left bank of the Arzen Su, are the ruins of a fine bridge of four arches; a part of it remains in good preservation, and was amply sufficient to show the magnificence and solidity of the original structure. The whole, when intact, was a double way covered in with solid masonry to suit the purposes and prevent the confusion incidental to a constant and active cross traffic. Each way is 8 feet broad, with a raised pavement on either side for the convenience of foot passengers. In no part of the East have I ever seen a nobler relic, or one of a similar construction so suggestive of an active civilization and a teeming opulent population. I regret I could not fix the actual date of its erection, although from its style I should be inclined to attribute it to the earlier Eioobites. From Redhwan I went by Ushey Kalla, situated on an upland about three miles from the Bohtan Su to Ba Til, three miles

* St. Martin confounds Huzu, which the Armenians pronounce Hzou and Khzou, with Hizan, another and totally distinct district and town north of Saert. This is the more curious, as he nevertheless places Huzu correctly in Sassoon.—'St. Martin Mem. sur l'Armenie,' vol. i. pp. 175, 176.

above the confluence of the Bitlis Chai with the Bohtan. From here the Taulik Pass, a steep and rugged ascent of an hour and a half, brought us to the crest of the mountain overlooking the small Saert plain, and in another hour and a quarter reached the town itself.

From Saert, first descending the precipitous Hauraz Soro Pass on the right bank, and then following the left bank of the Bohtan Su, coming through splendid wild mountain scenery from the east, and crossing some of its tributaries, I arrived, in seventeen hours, at Khoskheyr, on the Shattak Su, the capital of the Bohtan Berwaree district, passing eighteen miles from it the large Christian villages of Dantass and Feroze, situated on either side of a deep ravine absolutely choked with enormous walnut-trees and luxuriant fruit-gardens and cultivation. About three miles north-west of Khoskheyr the Möx and Shattak rivers join, and the united streams then take the name of the Bohtan Su till it is finally absorbed in the Tigris, at Til.

The country between Saert and Khoskheyr, and indeed generally in this part of Kurdistan, is a succession of hills and mountains with well-cultivated uplands and deep fertile valleys. The higher mountains take the same course as the rivers, with lower connecting ridges between them. The Bohtan Su, and streams that flow down to it, passing through grand mountain scenery, are lined in many places by a thick fringe of almost impervious orchards, woods, and vineyards, encircling picturesque villages. Each bend of the river reveals new beauties, and the traveller, while contemplating these charming and peaceful-looking spots, can hardly reconcile their existence with the lawless character of the savage country, and of the people who tenant them. A closer visit, however, dispels much of this delightful illusion, and reveals a state of poverty, wretchedness, anarchy, and ruthless despotism hardly credible to any but those who have taken the trouble to step out of their path to judge of things with their own eyes.

Khoskheyr* is situated at one end of the Harakol mountain, that here slopes down upon the Bohtan Su. It is several hundred feet above the river, and the slope to it is covered with numerous carefully-cultivated gardens, yielding the finest peaches, grapes, figs, pears, and sultane raisins I ever saw or tasted. The town itself contained, four years ago, 260 houses; at present there are scarcely 120, and of this small number 50 had been gutted and burnt a few days before my arrival, in a conflict between two

* The capital of the Bohtan Berwaree. Berwaree is derived from the Kurdish "Berwar," meaning a shelf or step, as all the villages are built on the shelves or slopes of the hills. May it not be derived from the old Armenian King "Barouir"?

local hostile parties whose chiefs were litigating before the Turkish governor at Saert. The Kurds here belong to a tribe originally Yezid, called Adian or Adiites, descendants as they say of the real Sheikh Adi, the saint of those extraordinary people.

Having been informed at Saert that arrow-headed inscriptions and Assyrian sculptures existed at Hozeem, a village a few miles up the left bank of the Möx Su, in the peninsula formed by the close proximity of that and the Shattak river, I made preparations to visit it on foot, as the impracticability of the mountain road made it nearly impossible to reach it on horseback. Leaving my servants and baggage at Khoskheyr, and accompanied by some Kurds as guides, I crossed the Shattak Su to its right bank by one of the composite wood-and-wicker bridges so common in Kurdistan. Before us were the steep barren heights of the Churruk Dagh, which occupied two laborious hours in ascending; but our fatigue was well rewarded by the extensive panorama obtained on arriving at its extreme height. To our right and left were the Shattak and Möx Sus, separated only from each other by a narrow though high mountain-ridge (from which I procured some rich specimens of copper and lead ore), running parallel to them, while before us was the smiling valley of Bidar, backed by its old castle, and embedded in its fruitful and luxuriant gardens. Our road to it was by an abrupt descent equally fatiguing as the ascent, but far more exhilarating, as we had the advantage of walking a greater part of the way in the shade of different kinds of trees that clothed the slopes. Another two and a half hours' walk brought us to the village, after we had crossed the Möx Su to its right bank. The distance between the Möx and Shattak rivers here is scarcely 400 yards, and the villagers informed me that in ancient times a canal had connected them at this point. The mountains that rise perpendicularly behind the village form part of the present Mudirlik of Ispaert, a name originally applied also to the contiguous north-western districts, and forming part of the old Hysparitis of Strabo.* After a short rest, we proceeded, still on foot, by an execrable mountain-path (leaving the Möx Su on our right) towards a high peak called Sir i Khach or head of the cross. It took us one and a half hour reaching it, when we again had the Möx Su close to, but hemmed in by steep frowning cliffs, and the village of Akük in a small fertile plain below us. Descending into it, we were again on the river, our road being along its left bank close up to Hozeem, where we crossed it by a rude bridge, and reached that village in three hours from Bidar. I was disappointed, on arriving, to find that the much-vaunted inscription was nothing more than a collection of small crosses that had been scratched on the smooth face of

* Strabo, lib. xi.

the rock by the children of the place, while what had been taken for the sculpture was simply a huge mass of misshapen rock that had fallen from the heights above. Travellers in the East are so subject to similar disappointments that they think little of them; and in this case I was amply rewarded for the fatigue of my walk in having been able to ascertain the real courses of the headwaters of the Eastern Tigris, and to visit a beautiful and interesting portion of Kurdistan never before trod by Europeans. In the centre of the village was a fine old church* with an elaborately-carved doorway. Similar work also decorated the interior, but the natives had taken considerable pains to cover it with mud and plaster so as not to excite the cupidity of the Kurds. Behind the village, and about twelve miles north-east of it, is the high mountain of Aghovar, at the base of which is a cave from which issues the Möx Su.

The distance from this cave, and the nearest point of the great Van lake is scarcely 30 miles of mountainous country: and it is possible that Strabo might have alluded to this branch of the Tigris when describing the origin of that river to be in Lake Thospitis, and its subsequent underground course on emerging from it. As it is probable that he never visited the site, for a description of which he was indebted to native reports, he might easily, from its described contiguity to the lake, have been inclined to believe in the myth he has propagated.† The following tabulated form will give the names and sources of the different rivers forming the Upper Tigris, beginning at its extreme western or Arganeh Maaden branch:—

WESTERN TIGRIS.

| *Names.* | *Sources.* |
|---|---|
| Arganeh Maaden River. Dibeneh Su. (These two unite as described at Ammaneh Castle, and form the Diarbekr branch of the Tigris.) | Rising 20 miles west of Arganeh Maaden town, and 10 miles south of the centre of the Guljik or Kharput Lake. Dibeneh Su, rising 4 miles N.W. of Korkar village. |
| The Ambar Su | Rises at Heyni town, and falls into the Tigris opposite Kurkh. |
| The Batman Su—flowing 5 miles east of Miafarkeyn, and which is formed of the united waters of the Kulp, Kaushan, and Sarum Sus—falls into the Tigris opposite Zeywa village. | The Kulp Su rises about 12 miles north of Nerjiki village. The Kaushan Su, 14 miles N.W. of Nerjiki, in the Parkush Dagh, and the Sarum Su, 10 miles N. of Peychar, 30 miles N.W. of Nerjiki. |

* Dedicated to St. Stephen, St. John, and the Mother of Christ.

† The Shattak River rises near the town of the same name. It is 20 miles east of Möx. Mr. Layard says Shattak (or Shach) stands near the junction of two considerable streams forming one of the headwaters of the eastern Tigris, and uniting with the Bohtan Su. The largest comes from the district of Albagh. —See Layard's 'Nineveh and Babylon,' p. 420.

| | |
|---|---|
| The Khuzu, Huzu, Arzen, Redhwan, or Yezid Khaneh Su. | A collection of small brooks and streams that commingle 8 miles N. of Huzu Town, falls into the Tigris 8 miles W. of Til junction of East and West Tigris. |
| | EASTERN TIGRIS. |
| The Bitlis Chai, which is the united waters of that and the Keyzer or Shirwan Rivers, and falls into the Bohtan Su near Ba Til. | Bitlis Su rises about 8 miles N. of Bitlis.<br>Keyzer or Shirwan Su rises in Shirwan district, 14 miles N.W. of Saert, and joins the Bitlis Su at Gundey Millan, 6 miles S.W. of Saert. |
| The Bohtan Su, which falls into the Tigris at Til, is composed of the Bitlis Su (above), the Mox, Shattak, Chamkaree and Sarhal Sus. | Mox Su at Aghovar Cave, Shattak Su rises near Shach: they join 8 miles N.W. of Khoskheyr. Shattak Su receives the Chamkaree Su 6 miles N.E. of Bidar. Sarhal Su rises 14 miles E. of Khoskheyr, and falls into the Bohtan Su at Kellees. |

Unlike the comparatively sluggish branches composing the Western Tigris, which, before uniting with the trunk stream, generally flow through plains of alluvium, the streams of the Eastern Tigris run with arrow-like swiftness through deep rocky beds pent in by high mountains. Practicable fords at all seasons are rarely met with; and for this reason the different rivers composing it are, even in these degenerate times, better bridged than those composing the western branch.

I walked back to Khoskheyr by a rude and difficult mountain-path that follows the course of the Shattak Su, and reached it in six and a half hours from Hozeem. All the working and industrious portion of the population of the mountainous districts here, and generally throughout Kurdistan, are Armenian and Nestorian Christians, living in a state of serfage, they being the property of the local Kurdish chiefs, who call them their "Zeer Khurlees," a term signifying bought with the yellow—meaning gold; as, in fact, they are bought and sold in the same manner as sheep and cattle. This custom originated of course in the absence of any recognised government, and in the consequent independence and power of the Begs and Aghas upon whom the Christians were dependent. To ensure their protection, they first paid them yearly sums in cash, on the same principle as the Arab Khooa, but subsequently their increasing poverty and the avarice of the chiefs made it impossible for them to make the usual payments; and to avoid expulsion, therefore, from their old lands and country, they voluntarily submitted to the pernicious system under which they now live. Like the serfs in Russia, they are disposed of with the lands they cultivate, but cannot be sold individually, though the chief can appropriate as much as he wishes from their yearly earnings,

capital or goods. As an instance of the light in which they are regarded by their Moslem owners, I will cite a fact that was brought to my notice in these parts, and corroborated by the Turkish authorities. The "Zeer Khurlee" of one of the chiefs was shot by another Kurdish Agha; his owner did not attempt to retaliate upon the murderer, but quietly shot two of his "Zeer Khurlees," although they had no part in the assassination of their co-religionist.

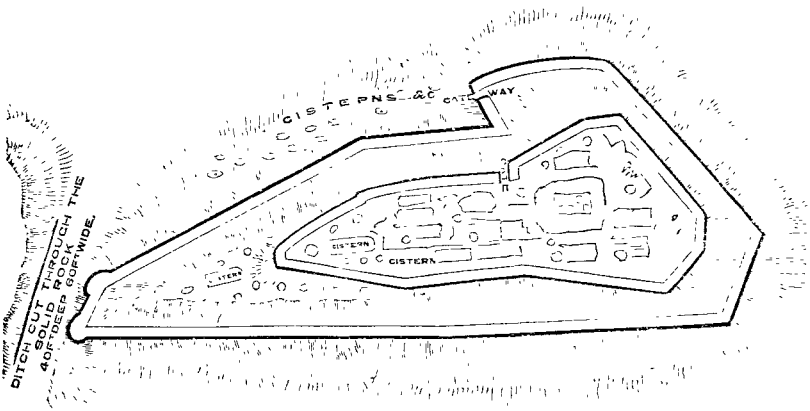
From Khoskheyr, after following the course of the Sarhal Su, another large tributary of the Bohtan Su, which it joins at Kellees, and visiting the districts of Eyruh, Deh, and Deyr Gul, I proceeded to Jezireh,* and then west to Ispiss, in the Jebel Tur. It is situated in the middle of a mass of ruins, the relics of an ancient and very large town. At its north-east end is a deep and nearly inaccessible ravine, through which a small stream runs towards and falls into the Tigris, irrigating in its course extensive rice-fields and gardens. On the edge of the cliff are the ruins of an old church, built, like the town, of black basalt. Three miles farther off, on the banks of a similar but dry ravine, are the ruins of Feer, where local traditions have it Shapoor put 6000 Christians to death on account of their religion, and for having induced his son to adopt their faith. In the mountainous country about this and Jezireh there is a kind of wild silk, procured in such quantities that the native women use it extensively for dresses. It is called Quz and Jez,† and is the produce of a caterpillar that feeds on a low shrub with dark-green serrated leaves, bearing clusters of flowers similar to the laburnum, which in time produce a bunch of pods very similar to beans. Striking south-west, in the direction of the Mesopotamian plain, by the villages of Giri Worseh, Hazarnukh, and Delavi Kusri, we arrived at the old ruins known

* The Tigris at Jezireh was formerly spanned by two fine stone buildings. Of the one near the town no vestiges beyond pieces of the buttresses exist, but of the second, which was some way below it, an entire arch near the right bank still remains. On its southern cornice the signs of the Zodiac, with their names in early Arabic, are carved with considerable spirit, nearly the size of life.[1] In the town itself the most interesting remains are the ruins of the old castle of the Attabegs, with a beautiful circular Saracenic mosque in one of the courts, and the old mosque, with a magnificent bronze door curiously embossed and ornamented, raised by the Zengide Abu el Qassem Makhmood Moez ed' Deen Sinjar Shah ebn Ghazi, in the sixth century of the Hejireh, on the site of the old Christian convent of Mar Yohanna. On several parts of the walls are old defaced Arabic inscriptions, but on the Babel Tor, in rude Cufic, is a record of Ezel Islam Saaded Dowlet Abi Ahmed ebn Merwan—the Kurd Merwainde—of the fifth century of the Hejireh.

† Pliny alludes to this silk in his Nat. Hist., xi. 23.

[1] Built by Jemal ed' Deen Abu Jaafer Mohemed ebn Ali ebn Abi Mansoor El Isfahanee, Wezeer of Qutb ed' Deen Modood, Attabeg of Mosul. Ibn Athir, A.H. 558, vol. xi. fol. 204.; Abul Fe la, vol. iii. fol. 592.

here as the Hatem Tai Kalla situated on a hill in a mountain gorge overlooking the plain near Bazara village, where I purchased a fine coin of Demetrius Soter, and several Cufic, Byzan-




No. 3. Plan of Hatem Tai Castle (ancient Sisauronon).
N.B.—All the circular marks are cisterns excavated out of the solid rock.

tine, and Roman medals. Considerable pains had evidently been lavished to make this fort as impregnable as possible; and at points where it seemed easy of access, the rock had been cut away, and inclines made steep and inaccessible by means of masonry. The principal buildings were constructed upon a rock that springs out of the summit of the hill; and some extensive reservoirs for water, of great depth, were scooped out of the rock, and then arched over with stonework, as at Dara. The whole was encircled by a strong wall; and some little way from, and below it, another wall, following the contour of the hill, surrounded the first. It was further strengthened and isolated by a cutting through the rock, similar to those alluded to in other ruined castles I have described. This place appears to me to be identical with the Persian fort of Sisauronon, which Procopius narrates was surrendered to Georgius, an officer of Belisarius, while on his march from Nisibin to the Tigris.* Four hours and a half west of Hatem Tai is the convent of Mar Bauai; and near it, in the mountains, the celebrated old monastery of Mount Izla, the seat and burialplace of the disciple of Hilarion, Mar Auageem, or Eugenius, who first introduced monastic institutions into Mesopotamia. Not far from this are the ruins of another fort, called

* Procop. De Bel Pers., lib. ii. cap. 19.

Kalla Jedeed, a relic of the early Moslem period. From Mar Bauai I went to Nisibin.

The important events that occurred in and about this old town when it was known under the different names of Zobah,* Nisibis, and Antiochia of the Mygdonians, would in themselves fill a volume: and the recollection of the mighty deeds that were performed here dispose one to dismiss the idea that the limited collection of vile hovels that now mark the site could ever have been the arena for such important events. The only relics that exist of its more ancient date are fragments of some massive columns and heaps of rubbish a little distance from the town; while the early Christian period is marked by the imposing ruins of the large church of St. James, or Jacob of Nisibis, who was raised to that see A.D. 325.† During his episcopate‡ Shapoor besieged the city for seventy days; the pious prelate ascended the walls, and, with eyes upraised to heaven, implored aid from God, who sent such a swarm of gnats and flies§ as to drive the Persian army away.‖

It is known to the Armenians as Medzpine, and was given by Arsaces to his brother Vagharschag (Valarsaces), "the beautiful, the skilful archer," as his capital.¶ According to them, the early Abgari held their court here; and it was the residence of their gods Naboc, Bel, Patriecagh, and Tarata!** Destroyed by an earthquake, it was rebuilt by Sanadrong, who encircled it with double walls and ramparts.†† Naboc, or Napok, is conjectured to be the Assyrian Nebo:‡‡ and the valley of the Jaghjagha, north of Nisibin, which will be described presently, is known under the name of the Wadi Bir Nussr by the Arabs, from an Arab chief of that name: but, at the same time, it is highly suggestive, as being derived from the name of the idol formerly worshipped here. The Nisibin River is called the Jaghjagha (Mygdonius of the Greeks, Hermas of Abul Feda), which falls into the Khaboor (Abornai of Judith, Chaboras and Aborras of the Romans) some way below the town. Above the town (where it emerges from the hills) the Jaghjagha has been divided into several small streams, for irri-

* The name of Zobah is preserved to this day in the name of a Bedouin tribe of the same name who encamp in its vicinity. They are now considered as belonging to the Shamr, but they themselves lay claim to being, with the Tai, the early possessors of this region long before the Shomr invasion. Nazibina of the Assyrians.—See Professor Rawlinson's 'Monarchies,' vol. ii. p. 258.

† 'Assemanus,' vol. i. p. 17.

‡ Abul Furruj states the siege took place under the episcopate of St. Ephraim Syrus.

§ Ibid., vol. i. p. 26, Abul Furruj. 'Hist. of the Dynasties.'

‖ This tradition is perfectly reconcilable with what I have myself experienced in this vile place, and from the recollections I have of weary days pestered by flies, and sleepless nights devoured by mosquitoes, when I was compelled on several occasions to make it my headquarters late in the year.

¶ 'Moses of Chorene,' vol. i. p. 39.

** Ibid., vol. i. p. 209. †† Ibid., vol. i. p. 237.

‡‡ 'Revue Orientale,' vol. xviii. p. 221, "Sur la Paganisme Armen."

gating the large cotton and rice-plantation in its neighbourhood. From carelessness in irrigation a great quantity of the water escapes, and forms large marshy plots, which in summer and autumn emit pestilential exhalations, producing very pernicious fevers. In those seasons it is shunned by the Bedouins, who, however, flock there in winter and spring, to obtain their necessary supplies, and to dispose of their produce. The northern part of Mesopotamia, in which Nisibin is situated, is peopled by Arabs and Turcomans. The former consist of the Shamr and the Tai, who are dependent upon the Shamr now, although they formerly were the real owners of the pasturages. It is only seventy years ago that the Shamr, under Faresebn Omr ebn Mehemed ebn Abdul 'Aziz, first came from Nejd, and occupied the country, the present Sheik Ferhan being the grandson of Fares ebn Omr, from whom the country they roam over is sometimes called by them Jeziret ebn Fares. It is hardly necessary to say that they pay no tribute whatever to the Turkish Government; on the contrary, their head-men receive a monthly salary from the Turks, and levy, in addition, black mail from every traveller and caravan passing through their territory, and also from all the villages and towns in the plains subject to them. They are the curse of the country, and have totally put a stop to everything like cultivation and improvement in the splendid tracts they call their own. Under a strong and liberal government, and with the water system, climate, and soil of that part of Northern Mesopotamia terminated by the Jaghjagha and Khaboor, several thousand bales of cotton alone, of a very fair quality, might be raised annually. Some two hundred years ago it used to be a favourite crop with the natives; and at that time Marco Polo* was astonished at its quantity and fineness. Now, however, the country is literally a desert—a vast uninhabited plain, though studded profusely with old tumuli and heaps of rubbish, the former abodes of an exuberant, peaceful, and industrious population.

The names and numbers of the different tribes, Bedouin and Fellaheen, subject to them are exhibited in the following table:—

| | Tents. |
|---|---|
| Khuressch .. .. .. .. .. .. .. .. .. | 800 |
| Fedagha .. .. .. .. .. .. .. .. .. | 2,000 |
| Thabet .. .. .. .. .. .. .. .. .. | 1,000 |
| Abdeh .. .. .. .. .. .. .. .. .. | 2,000 |
| Aamood .. .. .. .. .. .. .. .. .. | 700 |
| Es' Saieh:— | |
| Saieh .. 500<br>El Eslem 1500<br>Es' Sedeyd 500 .. .. .. .. .. .. .. .. | 2,500 |
| Carried forward .. .. .. .. | 9,000 |

* Marsden's 'Marco Polo,' p. 47.

| | Tents. |
|---|---|
| Brought forward .. .. .. | 9,000 |
| Fedagha, a tribe of Aenezee, with the Shamr .. | 3,000 |
| Tai Arabs, with Shamr .. .. .. .. .. .. | 1,500 |
| Tents .. .. .. .. | 13,500 |
| Souls .. .. .. .. | 81,000 |

All these tribes are also subdivided into septs. The Mehemed, or reigning tribe, belongs to the Khuressh.

FELLAHEEN TRIBES SUBJECT TO THE SHAMR.

| | Tents. |
|---|---|
| Jeboor .. .. .. .. .. .. .. .. .. | 1,500 |
| Baggara .. .. .. .. .. .. .. .. .. | 1,000 |
| Sherabieen .. .. .. .. .. .. .. .. | 600 |
| Khudhr .. .. .. .. .. .. .. .. .. | 2,000 |
| Harb .. .. .. .. .. .. .. .. .. .. | 600 |
| Hadidieen .. .. .. .. .. .. .. .. | 2,000 |
| Albu Assi .. .. .. .. .. .. .. .. | 500 |
| Ghassanieh .. .. .. .. .. .. .. .. | 400 |
| Tents .. .. .. .. | 8,600 |
| Souls .. .. .. .. .. | 51,600 |

All these pay tribute to the Shamr in money, grain, and cattle.

The Turcoman tribes (they are called erroneously Kurds) are the Milleea and Kikeea, and are the descendants of the old Artokide Kings. Like the Fellaheen, they are completely under subjection, and pay tribute to the all-powerful Shamr, in default of which they would be driven, without the slightest hope of redress, from the villages and pastures they have possessed since the downfall of their race. The Milleea number 600, and the Kikeea 1000 tents, and occupy the extreme northern part of Mesopotamia, from Mardin to Veyran Shehr, the ancient Tela.*

Three-quarters of an hour north of Nisibin, and on the left bank of its stream, where it emerges from a ravine of Jebel Tur into the plain, is a large flat-topped Assyrian tumulus, called Tel Nuas, a corruption probably of the Greek word, signifying a temple. The remains of brick, pottery, and glass, seemed very old; and I procured from the people about two stone cylinders that had been found among the *débris* at its base. The Jaghjagha has two sources, the Av i Spie, and the Av i Resh; the latter, however, being considerably farther from Nisibin than the former. As the course of the river had never been traced, or its sources visited

* The ruins at Veyran Shehr are massive and most extensive. They mark the site of Antipolis and Tela, which was restored by Constantius, A.D. 350, who then gave it the name of Constantina.—'Assemanus,' vol. i. p. 253.

by Europeans, I took this opportunity of reaching Mediat by the valleys through which the different streams and the Jaghjagha flow.

In entering the valley through which the river runs, the traveller is at once introduced into a different climate and scenery. The hot winds and sterile look of the plain are exchanged at once for cool breezes—umbrageous trees and thickly-wooded gardens and groves extending for a distance of several miles on both banks of the river, in strange contrast with the comparatively bare hills on either side. The size and abundance of the timber fully justified the name of the "Forests of Nisibis," from which Trajan procured the materials for his fleet. Here and there, on the left hand, are fragments of old massive walls (but nothing in a connected form) up to the village and ruin of Kyr Banos, a distance of 12 miles; the district, as well as the valley of the river in which it is situated, being called the Boo Nusser. In two and a quarter hours we crossed to the left bank of the river—here a turbulent, deep, and rapid stream flowing in a rocky bed—to visit a ruined temple, 35 feet long, and 18 broad, called Chengi Sahaba. It has a double wall, built of large blocks of black stone, each one measuring 3 feet 3 inches long, and 2 feet 1 inch thick, situated in a confined and narrow angle of the gorge. Near it are numerous pieces of thick, ancient pottery, and an old grot, but no other remains. In half an hour from this I passed the junction of the Av i Spie, with the Av i Resh, and, following the former, reached its sources, consisting of a deep spring, and a stream that issues from the base of the mountain, half an hour afterwards. About the spring were masses of ruins, of the same construction and material as at Chengi Sahaba, but more extensive; and in the rock near it, several neatly-constructed and capacious grots. A gradual ascent, still north for a couple of hours, through a prettily-wooded country, brought us to the table-land of Jebel Tur, and a couple of miles farther on to Daleen village; from whence a ride of two hours west, over a rough mountain-road, conducted us to the ruins of Sha Resh or Dhu Rishk, situated in a small plain on the left bank of the Av i Resh, and a mile and a half below its source. These remains, though more extensive, are in the same style, and built of the same material as already noticed at the Av i Spie and Chengi Sahaba. They are surrounded, and nearly concealed from view by a grove of old oaks, evidently of a much later growth than the original date of the ruins, for the dilapidated courtyards and arches are now choked by the fallen branches and rotten trunks of many of the older specimens. A watercourse a mile long, $2\frac{1}{2}$ feet broad, and 5 deep, cut out of the solid rock, leads from the head of the Av i Resh close up to the centre of the ruins. The Av i Resh or black water, is, as its name denotes, of a darker colour

than the sparkling crystal streams that form the Av i Spie or white water, and has its rise in a deep sluggish pool near some old grots, similar to those about the sources of its sister stream. From here, a pleasant ride of four hours and a half, passing through Anhel and Kushraf, took me to Mediat, from whence I returned through the Omerian mountain and Kharaib i Baba to Dara, and then by the usual road to Mardin and Diarbekr.

The districts alluded to in this paper compose, as already stated, the modern Turkish province of Kurdistan. Watered by an infinity of noble streams, with a salubrious climate and rich soil, it yields to no other province for the variety and richness of its vegetable and animal produce, while its numerous mountain-chains abound in mineral wealth. Among its natural vegetable productions galls, gum-tragacanth, madder-roots, and the Pistachio terebinthus, from which the natives extract a fine oil (used in making soap) are the most important; the value of the export of the former alone being upwards of 35,000*l.* Oleaginous seeds and olive-oil are produced in large quantities; and the quality of the former is so superior that it finds its way to many of the northern governments. Sheep's wool was exported in 1863 to the value of 70,000*l.*; and mohair, the produce of the Angora goats, that thrive so wonderfully in the neighbourhood of Jezireh, was eagerly sought after, and bought up by native traders from Kaiserieh and Constantinople, in the same period, to the amount of 20,000*l.* The manufacture of native cotton cloths, shallees made from mohair, and short woollen cloaks, is actively pursued; and the shallee, for texture and variety of colour and pattern, shows the extraordinary natural intelligence of the Kurdish workmen. Diarbekr itself is famous for its silk piece-goods, similar to those of Aleppo and other parts of Syria; but, from its greater cheapness and durability, more in request among the poorer classes of the mountains between Diarbekr and the Black Sea. Sheep are exported in large quantities from the mountains and Desert to Aleppo, Damascus, and Beyrout; and camels, purchased from the Arabs, to Kaiserieh and other parts of Asia Minor. The uplands and hills abound in several species of polecat, marten, foxes, and wolves, whose furs add considerably in value to the sum total of the export list. A beautiful species of spotted lynx (Wushek) may be included among the former, although it is far more scarce than those enumerated. A rough estimate of the whole value of the vegetable and animal produce of the Pashalik, whether consumed at home or exported, will amount to more than 700,000*l.* sterling. The approximate amount of the population living in the 2702 villages and towns, or in the Desert under the Diarbekr government, is as tabulated below:—

| | Moslem Houses | Christian Houses. | Tezid Houses | Kizzi Bash Houses. |
|---|---|---|---|---|
| Diarbekr Sanjek .. .. .. .. .. | 23,497 | 8,740 | 228 | 1,516 |
| Saert Sanjek . .. .. .. .. .. | 21,532 | 6,512 | 917 | 1,000 |
| Mardin Sanjek.. .. .. .. .. .. | 21,101 | 6,413 | 489 | .. |
| Nomad Kurds' tents .. .. .. .. | 8,260 | .. | .. | .. |
| Nomad Arabs' tents .. .. .. .. | 13,500 | .. | .. | .. |
| Agricultural or sedentary Arabs' tents.. | 8,600 | .. | .. | .. |
| Nomad Kurds with Arabs' houses and tents .. .. .. .. .. .. .. | 1,600 | .. | .. | .. |
| | 98,090 | 21,665 | 1634 | 2,516 |
| At six souls each .. .. .. | 588,540 | 129,990 | 9804 | 15,096 |

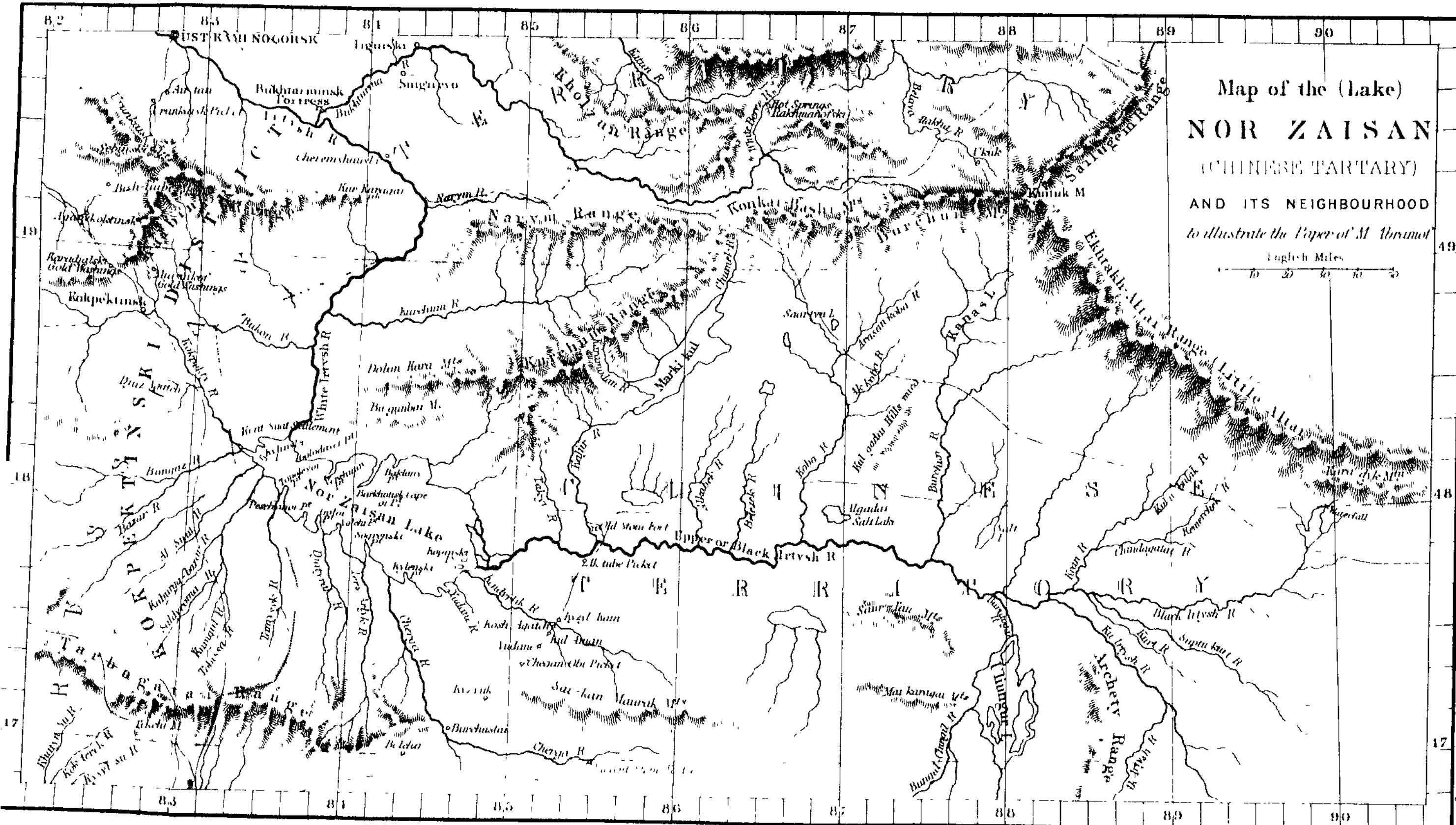
The general average of taxes paid by each house, not including Arabs who pay nothing, is,—for a Moslem house, 147 p. = 1*l.* 6*s.* 8¾*d.*, and for a Christian house, 188 p. = 1*l.* 14*s.* 2*d.* annually. The gross revenue of Government is 179,532*l.*, against an expenditure of 43,493*l.*, leaving a net revenue of 136,039*l.* Yet, during the prosperity of the Abbasides, deducting revenues of districts not now included in the Diarbekr Pashalik, the same tracts yielded a net annual revenue, derived principally from tithe on the produce, of 11,750,000 silver dirhems, which at 8*d.* only would give 440,000*l.** And considerably later, in the time of the Zengides, the comparatively small and now worthless district of Sinjar, which, however, included Nisibin, alone gave a larger income than the present Pashalik.

IV.—*The Lake Nor-Zaisan and its Neighbourhood.* By A. ABRAMOF, Member of the Imperial Geographical Society of Russia. Translated from the Russian by JOHN MICHELL, Esq.

*Read.* January 9, 1865.

LAKE Nor-Zaisan is situated between 47° 40′ and 48° 20′ N. lat., and between 83° 10′ and 84° 50′ E. long. (Greenwich), in the province of Yobdi of the Chinese empire. Its south-western borders very closely touch the Siberian frontier, adjoining as they are to the Kokpektinski district of the Semipalatinsk region. This lake spreads itself out in a broad and elevated valley, surrounded by mountain ranges on three of its sides: on its north-eastern or Altaï side, on the north-western or Kolbinsk side, and on the southern or Tarbogatai side. The spurs of the Tarbogatai range, commencing from the mouth of the Upper Irtysh, down along the left bank of

* Ibn Khaldoon, cap. 16, sec. 3 of lib. i. of his 'Prolegomena.'



Map of the (Lake)
NOR ZAISAN
(CHINESE TARTARY)
AND ITS NEIGHBOURHOOD
to illustrate the Paper of M. Abramof
English Miles
Ust Kamenogorsk
Bukhtarminsk Fortress
Irtysh R
Narym R
Narym Range
Konkai Bashi Mts
Burchun Mts
Kurchum Range
Kurchum R
Dolon Kara Mts
White Irtysh R
Nor Zaisan Lake
Upper or Black Irtysh R
Ekhtakh Altai Range (Little Altai)
Saligem Range
Khoitun Range
Katun R
Belaya
Hot Springs Rakhmanofski
Kanas L
Kaba R
Burchun R
Ulungur L
Archety Range
Black Irtysh R
Tarbagatai Range
Kokpektinsk
Kokpekty R
Chernya R
Saur Mts
Marki kul
Ulgadai Salt Lake
Kara Adyr Mts
Old Stone Fort
Waterfall
Kak-tube Picket
Sau-kan Maurak Mts
Mai kamgai Mts
Burchustai
Bazar R
Kunuk M
Chinese Territory
Kokpektinski District
Edw. Weller

the Zaisan, are severally known under the following appellations: Makrak, or Magarak, Charbulak, Tramuinak, Hatun, Amu, Urentau, Sarkul-Laba, and Urchun-Baba. The height of this lake above the level of the sea is approximately 1800 feet.*

Nor-Zaisan Lake was formerly called by the Mongols Kun-Bloti-Nor, or the lake of bells, on account of its waves producing, when striking against some parts of the shore overgrown with reeds, a sound which resembled from a distance the tinkling of bells. Its present name of Nor-Zaisan has been given it by the Kalmyks since 1650, when, during a period of famine, they supported themselves with the fish caught in the lake, and in grateful remembrance called it Zaisan, which in the Kalmyk language signifies "noble" or "honourable."

The inhabitants of Siberia in the seventeenth century called this lake Kyzalpu.† The length of Nor-Zaisan, reckoning from its eastern extremity to the point where the White Irtysh flows out from its right shore into Russian territory, is 66¼ miles English; and from hence to its extreme end, the distance is estimated at about 20 miles. The whole length is thus about 86⅔ miles; the width between the Golodayef and Volchi Capes is 10 miles; but farther on, it widens to 30 miles. The whole surface measures about 2508⅓ square miles.‡ Soundings in the lake gave a depth in some parts of 40 feet. In former years it was of greater extent and depth; and that such was the case is confirmed by the existence of sand-hillocks at a considerable distance from the present shore, and by the low marshy land in the neighbourhood of the lake being overgrown with reeds to a considerable extent. The waters of the Zaisan are transparent, fresh, soft, and good for cooking purposes, but of a reddish colour in the deep pools and indentations. The lake becomes covered with ice between the 1st and 6th November, and again clear about the same time in May. Its level rises during the influx of the water of the Upper Irtysh from the middle of June to the end of July.* The bottom of the lake is in some parts clay and in others mixed with small pebbles, and white, yellow, red, and blue varieties of silica.

The shores of this lake are depressed and overgrown to a considerable extent from the water's edge with reeds. The borders for a distance of 20 miles from Baklany Point, below Barkhotisk Point, are bare; small mollusc shells are found in the sands of the shore. Between Barkhotisk and Baklany Point, large quantities of stones of the size of a pigeon's egg are washed on shore from the

* According to accounts of Dr. Meyer, who visited the Altai in 1826.

† Ritter, Erdkunde von Asien, II. Theil, I. Band, p. 635. Siberian chronicle in manuscript, preserved in the library of the Tobolsk Ecclesiastical Seminary, anno, 1655.

‡ 'Statistical Review of Siberia,' by Hagemeister, v. i. p. 33.*

bottom of the lake, and they are overgrown with fine green moss. From the eastern end, on the right side, the headlands running out from the mountains are:—Baklany, Barhotisk, Vershinin, and Golodayef; beyond the latter, on the left side, are Capes Topolevoi, Peschanoi, Goloi, Volchi Sogrenski, Kylenski, and three others not named.

Two islands, the Kopinski, occur near the point where the Upper Irtysh discharges itself into the lake at its head, and another island, called Kylinski, lies off its lower end; here also there are many nameless islands overgrown with reeds.

The following rivers fall into the Nor-Zaisan:—*On its eastern shore:* the Upper or Black Irtysh and the Kendyrlik. *On its western shore:* the Cherga, Ara-an, Ters-Arlyk, Djatyrak, Tamysyk, Tobissa, Kaburga, Aksuat, and others. The Black Irtysh issues out of the western slopes of the great Altai range in two branches, one of which, running due west from the Karadyk Hills, empties itself by a waterfall into a small lake, and then flows out of it in a steady stream; the other branch flows from the south-east in a north-westerly direction, and uniting then under an angle with the other stream, receives the name of Irtysh. The upper sources of this river are supposed to occur in 90° 20′ E. long., and 47° lat.; therefore the whole length of its course may be estimated at $466\frac{2}{3}$ miles. Its bed is stony, and in some parts obstructed by rapids, which—and particularly those above the mouth of the Burchun, render the navigation both dangerous and difficult. The banks of the Irtysh, from its mouth for about $13\frac{1}{3}$ miles up its course, are depressed and overgrown with reeds; farther on they become sandy, and at some parts rocky. The waters steadily rise in it from the end of May to the middle of July. In September it becomes so shallow that boats carrying a burden of five tons in many places pass with great difficulty. The number of fords that occur along its course is pretty considerable. Generally speaking, it is even much shallower than the White or Lower Irtysh. According to Tartar traditions, the name of this river was given it by the Tartar Khan Irtyshak, who ruled over Siberia at the latter part of the 15th century, and who despatched men of experience from Iskar, his capital ($14\frac{2}{3}$ miles above Tobolsk), in search of the source of the Upper Irtysh. If the true etymology of the name of this river is Tartar, its derivation will be from "Ir," earth, and "tysh," earth-fissure or rent. It is probably so called on account of the chief of the two branches of the Irtysh falling in a cascade out of a mountain gap. The following are the affluents of the Black Irtysh:—On its right, the Kran, Burchun, Koba, Alkabek, Kaljir, and Tokyr; and on its left, the Suptukurt, Ku-Irtysh, Burutogoi, issuing out of Ulungur lake, and the Temir-su. The water of the Upper Irtysh, though of a coarse quality, is pure, and hence its dark appearance; the

river has received the name of the Black Irtysh in distinction from the Lower or White Irtysh, the waters of which are turbid in appearance. The White or Lower Irtysh flows out of Nor-Zaisan Lake at its north-western part, and lat. 48° 13′ 37″, and long. 83° 35′ 36″ E. It continues its course first in a northerly direction within Chinese territory. It receives the Narym nearly at 49° 14′ 55″ lat., and bends sharply to the north-west until it reaches Bukhturminsk Fort. Over this distance, an extent of about 133½ miles, the country on both sides of the Irtysh presents a level plain, which imperceptibly declines to the north-west. The bed of the river is from 70 to 400 fathoms broad, and, like the Upper Irtysh, sinuous; the banks, however, are generally depressed, rising only at a few parts from 1 to 2 fathoms.

Between Lake Zaisan and Fort Bukhturminsk the Irtysh receives the following tributaries:—*On its right bank:* the Karaburek, Kalgut, Kurchum, Kainda, Narym, and Bukhturma. *On its left bank:* the Bukon, Klushin Lakla, Tchun-su, Kurkaragai, Kurumsu, Yakshi-ba, and Kurkura. The Narym rivulet is noteworthy on account of the frontier-line between Russia and China occurring on its embouchure.

The following kinds of fish are found in the Zaisan:—The sturgeon (*Accipenser sturio*), the sterled (*Accipenser ruthenus*), the Nelma salmon (*Salmo Nelma*), grayling or taimen (*Salmo fluvialis*), pike, roach, perch, trout (*salmo lenoe*), carp, and burbot. The sturgeons are of two species; the first have a light greyish skin, a small head, snub snout; their length is in proportion to their breadth; the flesh is tender, rich, and of a fine flavour. The second have a dark shiny skin, firm and very coarse flesh, incapable of being softened even by long boiling; their heads are large, noses obtuse and bent upwards; their bodies are thick, and out of proportion to their general size. The sterleds of the Nor Zaisan may be divided into three species: "Zaisanki," a dark-greyish-skinned fish, having half as much fat as flesh; its flesh is dry and coarse, and equally uncookable as the black-skinned sturgeon; its weight is generally from 36 lbs. to 72 lbs. "Golovashki," similar in quality to the Zaisanki, though differing from them in point of fatness: their heads are large, noses short, broad, and turned upwards; their weight varies from 6 to 20 lbs. This latter fish, together with the Zaisanki and black sturgeons, are caught in the Upper Irtysh, and but rarely met with in the Lower Irtysh. The ordinary sterled has a light-greyish skin; its flesh is soft, rich, and agreeable to the palate; its weight is from 5 lbs. to 20 lbs. The sturgeon and sterled remain during winter in Nor-Zaisan Lake and in the deep pools of the Irtysh, and descend the river to spawn in the beginning of May. They are then caught at the mouth of the Irtysh until the 13th June; but from that date to the 27th July

the quantity of fish taken in the river is considerable. From the 27th July to the 26th August spawnless fish are obtained, but the whole quantity caught within this period is small compared with the catches in April and May. From the 27th April fish also ascend the Upper Irtysh from the upper borders of Lake Zaisan; they are caught about this time in the Upper Irtysh, but the flesh of these fish is found to be hard and coarse. The weight of the *taimen* reaches 144 lbs.; the size of its head is in proportion to its general dimensions; the teeth are sharp, scales soft, colour dark green with light shades, fins and tail red; in spring it is in fat condition, and though it falls off in autumn, it is still tender and tasty. Its roe is large, but watery and tasteless. It is a very ravenous fish, preys on every other of its own species, and on anything it can secure on the surface of the stream. The uskuchi resemble the taimen in all points excepting size; they never exceed 8 lbs. in weight. Both fish pass the winter in the Zaisan. In May they ascend the Irtysh and its affluents; in September they descend again for the winter into the Zaisan.

At the fall of the Lower Irtysh into the Nor-Zaisan, and at the embouchure of the Black or Upper Irtysh, is situated the fishing-station of the Siberian Cossack troops. This fishery has been carried on by the Cossack soldiers for the benefit of their corps since the year 1803; its limits extended originally up the Irtysh, from the mouth of the Bukhturma as far as the river Narym, then to the Batavski pickets; later, however, parties came secretly as far as Nor-Zaisan for the purpose of fishing. Between 1822 and 1825 the limits of the fishing-ground were extended by General Kopsevitch to Nor-Zaisan and to the mouth of the Upper Irtysh, both for summer and winter operations. In 1842 the organisation of the fishery was changed, and it was decided to detach 86 reserve Cossacks and two officers for the purpose of carrying on the fishery. Private individuals were prohibited from catching fish, and could only purchase them through the government agents. The fishing season generally commences in the middle of May, and ends in Lake Nor-Zaisan early in September. After this period the Cossack fisherman ascends the Black Irtysh, and returns to the Krasnoyarsk Stanitsa, near the mouth of the Narym, by the end of October. The revenue derived for the benefit of the Cossack troops between the years 1842 and 1845 was 129,915 roubles (19,487*l.*). At the present time the net annual profit arising to the troops from this monopoly is 10,000 roubles (1500*l.*). Salted sterleds, nelmas, and sterled roe are despatched to different places for sale; ice-cellars and depôts being established for this purpose at Krasnoyarsk, Ust-Kamenogorsk, Semipalatinsk, and Omsk.

Although the fishing-station at the fall of the Lower Irtysh into Lake Nor-Zaisan, and at the mouth of the Upper Irtysh, is within

the limits of the Chinese empire, the Celestial authorities nevertheless, adhering to their peaceful policy, do not interfere with the Russians. In the middle of June a Chinese Anban* annually repairs from Chuguchak to the Batavski picket. A tent of white felt, with a linen covering, and bordered with blue festoons, precedes by a few days the arrival of the Anban. The interior is lined with different stuffs, the floor covered with a reed-matting, and carpets are placed on the pallets. A standard, bearing the emblem of the dragon, is erected in front of the tent. The younger members of the Anban's suite follow him on horseback, while the satellites of a higher order are borne in handsome palanquins, which are escorted by *Zenge*, or under-officers, bearing small flags with the dragon's device. Seventy soldiers form the military guard of the Anban. On his arrival at Batavski picket, the Russian officer in charge of the Cossack fishing-station sends a messenger to the *Zürgan* or adjutant of the Anban, to inquire when the Anban will be ready to receive him. At the time fixed, the Russian officer, in full uniform, and accompanied by his interpreter and several Cossacks, the latter bearing the presents intended for the Anban, betakes himself to the Chinese camp. The Russian officer first visits the *galdai*, or picket-officer, who leads him to the Zurgan. The Zurgan, after examining the presents, announces his arrival to the Anban, the entrance to whose tent is lined by Chinese soldiers drawn up in two lines. The officer in charge of the Russian fishing-station, and his interpreter, are conducted by the Zürgan to the Anban. This personage rises and greets the Russian officer by taking his hand; he then makes inquiries about the health of the Emperor, and the chief Russian authorities, and respecting the general wellbeing of the Russian empire, and lastly, whether the Russians suffer any injury or oppression at the hands of Chinese subjects. To all these questions satisfactory answers are given by the Russian officer, in return for which the Anban expresses his gratitude, and exhorts the Russians to continue to preserve the same amicable relations in the future, inasmuch as the monarchs of both empires are in amity with each other. The Cossacks then bring in the presents destined for the Anban, who at first hesitates in accepting them, but after making an inspection, receives them with grateful satisfaction; in return, he also makes some inconsiderable presents. The overseer-officer is then regaled with tea, spirits, meat, and pastry, which being discussed, the interview terminates. The stipulated peace-offering of 500 dried sterleds for the Anban is subsequently delivered over to the Zurgan. The stay of the Anban at the Batavski pickets does not exceed two or three days.

* Anban, governor of the region; ke-anban, colonel; moé-anban, lieut.-colonel; batyr-anban, major.

In the reeds around Lake Nor-Zaisan there are many wild boars, which feed on the roots of the *arundo calamagrostis*, a variety of cane, called *koga* by the Kalmyks. Otters are also numerous round about the lake, and large herds of saigas (*Antilopa saiga*) and wild horses inhabit the adjacent steppes. The immediate neighbourhood of the lake is frequented by swans, geese, ducks, cormorants, pelicans, seagulls, plovers, snipes, bustards, and pheasants. There are no forests near, and the only plants that occur consist of the saksaul (*Anabasis saksaul*), meadow-sweet, and steppe acacia. As the saksaul grows only in the Kirghiz Steppe, and is unknown in Russia, it will not be superfluous to describe it more minutely. This coniferous tree attains a growth of $2\frac{1}{2}$ fathoms in height and 6 or 7 inches in thickness. Its bark is yellow-green, its prickles soft, and salt to the taste: the wood is very solid and not pliant, being more easily broken than split. It burns even when damp, and gives out a pleasant odour. Along the course of the Rivers Kaljir, Koba, Burchun, Kran, and Ku-Irtysh, poplar, aspen, and birch trees grow plentifully, while at their sources are found the silver-fir, pine, fir, larch, and cedar along the Kran.

Amongst the earlier Russians who visited Lake Zaisan was the Boyar Theodor Baikof, Russian Envoy to China. In 1665 he started from Tobolsk, and reaching the ulus (camp) of the Kalmyk Faishi Ablai, passed the winter there. In spring he proceeded farther on his journey, and after travelling 13 days arrived at the Beska Rivulet, which falls into the Irtysh. Near this small river Ablai was then erecting two stone palaces, surrounded by a high wall: these buildings, known now by the name of Ablai's Halls, are situated at about $46\frac{2}{3}$ miles along the route to Kokbekty, on the left side of the Irtysh, in a beautiful and open valley, intersected by the small Ablaiketka Rivulet. This spot Baikof left on the 12th July, and reached by the 26th July the camp of the sons of Koutaishin; from hence, after a journey of 10 days, he arrived at Lake Kyzalpu, or Nor-Zaisan, beyond which he journeyed for 17 days to the sources of the Irtysh, proceeding then to China.

In 1719 Captain Urasof and Ensign Somof received orders from the Emperor Peter to proceed on an expedition to the town of Yarkand, in Eastern Turkistan, and, with the object of examining the gold-producing regions of Central Asia, they surveyed the shores of Lake Zaisan and the banks of the Upper and Lower Irtysh, which they reached in boats built in the Yamyshevsk fortress.

In a ukase issued in 1719 to Sukharef, the Governor of Siberia, he is ordered to survey the Kalmyk lands to ascertain the number of troops in force there, and to induce the local Faishis to take the oath of allegiance to the Tsar. With this object General Likharef was despatched from Tobolsk in 1720 up the Irtysh with 34 light

flat-bottomed boats. His forces consisted of 440 soldiers, drafted from Tobolsk and the forts of Yamyshevsk and Semipalatinsk, and 30 field guns and 6 mortars. The expedition reached Lake Nor-Zaisan: Likharef, however, could not find any convenient spot on the low shores of this lake for building a fort, and proceeding accordingly to the Upper Irtysh, he ascended it for 12 days and passed beyond the parts visited by Urasof and Somof. Goldai-Cheren, son of Tsevan-Raptan, who was encamped at that time with 20,000 Kalmyks on the left bank of the Irtysh, guarding the north-eastern frontier of Djungaria against the Chinese, astonished at the sudden appearance of the Russian flotilla, resolved to anticipate the attack. The Kalmyks evinced a desire to enter into negotiation with the Russians, and requested that a "tolmatch," or interpreter, should be sent to them. Likharef, however, paid no attention to this message, and continued his journey, covering his boats as they advanced with a party of musketeers. Seeing at last the dangerous position he would be placed in should the Kalmyks attempt to cut off his retreat in the autumn, when the Irtysh becomes shallow, he entered into treaty with them and assured them that the sole object of his mission was to ascertain where the Upper Irtysh takes its rise, the possibility of its being ascended to its sources, and to search for minerals. Although Likharef's expedition proved barren of results, nevertheless, in furtherance of the views of Peter the Great, the occupation of a vast region was at the same time effected and a line of forts established, which served as bulwarks to the then rising Russian settlements in Southern Siberia. In 1737 the Siberian line was extended, under the name of the New Siberian or Ishim line, as far as the advanced posts of Orenburg. Soon after the completion of this line, the strife and bloodshed, which lasted for ten years between the successors of the Djungar ruler Goldai-Cheren, led to the establishment of Chinese rule in Djungaria, and early in 1755 two Chinese armies, supported by the troops of Amursana, one of the Djungarian disputants, appeared to carry out the division of the Oirad territory into four separate provinces, to be placed under Chinese administration. The traitor Amursana, when calling in the aid of the Chinese against his countrymen, did not anticipate such an untoward arrangement, but calculated on becoming sole ruler over the whole of Djungaria. In 1756, when the Chinese generals were congratulating themselves on the success of their expedition, Amursana, detaching himself from them in order to carry out his own ambitious projects, compelled the Bogdykhan to send out another army against him, and which accordingly took the field in 1757. Nepluyef, the Governor of Orenburg, foreseeing the speedy downfall of Djungaria, had previously, in the year 1756, projected the annexation of the country as far as Lake Nor-Zaisan. It was, however, too late, as

Djungaria had already been devastated; and the Kalmyks, who had sought refuge in Siberia, bewailed their sufferings and described the horrors perpetrated by the Manchju-Chinese detachments. In this critical condition of the boundaries, in the neighbourhood of which the Manchju-Chinese committed everything to fire and the sword, it was incumbent on Russia to place her frontier in a defensive condition. This duty was confided to Soimonof, the Governor of Siberia, with whom the military authorities were instructed to co-operate. In 1759 it was remarked that if Chinese junks sailed with hostile intentions out of Lake Nor-Zaisan, their progress could not be checked by forts and posts along the Irtysh; that the Kolyvanokuznetsk line did not defend the mines and those worked beyond in the Altaï; that it did not protect the Teleuts who nomadised in the vicinity of the Teletsk Lake; and it was, therefore, for these reasons decided to extend the line up along the Irtysh, from Ustkamenogorsk, through an easy pass, to the River Bukhtarma, and the adoption of this measure was all the more advisable, seeing that the Chinese, the new rulers of Djungaria, would have no reason to dispute our occupation on the Bukhturma, if we did not station a force and establish ourselves permanently on the shores of the Zaisan.

In 1763 General Springer was appointed Commander-in-Chief over all the Siberian lines. He was instructed, among other things, to erect a fort on the Bukhturma River, which was to prevent any Chinese vessels leaving the Lake Nor-Zaisan. In the following year Lieutenants Zelenoi and Henezer were despatched, in the month of June, with a vessel and several boats to the Nor-Zaisan. This expedition convinced the Russians that a Chinese flotilla was not dangerous to Russia from that quarter.

Having now dwelt exclusively on the Lake Nor-Zaisan and its affluents, let us complete this article with a few observations on the neighbourhood of the lake.

Twenty versts below the Kaljir Rivulet, flowing from the right into the Upper Irtysh, stands a large stone, called the *tuetash*, and which from a distance has the appearance of a camel. Near the same place and where the bank of the river is pretty high, there exudes a slight stream of petroleum (*Alumen butiraceum*), containing sulphuric acid and a considerable quantity of earthy and resinous matter.

Ten versts below the Koba Rivulet, which also falls into the Upper Irtysh from the right bank, stands a hill, occupying two-thirds of a mile in extent, and bearing the name of Achudasta Mountain. It is formed of horizontal layers of ochre, varying in colour from dark-red to red, yellow, and white. The local Kirghizes prepare achudas or alum (*Alumen nativum*) from the red ochre, and also find the alum in a crystallised state (*Alumen*

*nativum cristallisatum*). The Kirghizes use this mineral in colouring their wares. Saltpetre, it is said, is also found in the neighbourhood. Hillocks of varied stratification, like Achudasta hills, are very numerous, particularly in the direction of the Altaï, on the right side of the Irtysh. Hillocks of similar formation occur also in localities near the Irtysh along the Kurchumu Rivulet, and on the right side of the Zaisan.

Near the source of the Ku-Irtysh, which falls into the Upper Irtysh, there is, according to the accounts of the Kirghizes, a hill of solid stone, from which naphtha is discharged. This naphtha was at one time supplied to the Bukharians and Tashkendians; but lately the Chinese have interdicted the sale of it and placed a guard over the spot where it used to be obtained.

In the Altaï Range, opposite the upper end of the Nor-Zaisan, at the distance of about $66\frac{2}{3}$ miles from it, is the Lake Marki, which is approximately $26\frac{2}{3}$ miles in length and $16\frac{2}{3}$ miles in breadth, its shores are in many parts rocky and high.

Between the Rivers Burchun and Koba, at a distance of 10 miles from the Upper or Black Irtysh, is a small saline lake. The salt which is deposited around is used for cooking purposes by the wandering Kalmyks and Kirghizes. Between these same rivers, 20 miles from the Irtysh, stands a hill of mica, the gleam of which, in clear weather, is visible for a distance of $6\frac{2}{3}$ miles. In former years this mica was transported for sale to Semipalatinsk and other places.

Proceeding about $6\frac{2}{3}$ miles up the River Kalji'r, which issues out in a series of large falls from Lake Marki and near the Karamodan Rivulet, which also flows out of this lake, stands a large fortification, surrounded by a wall of unburned bricks. At a distance of $13\frac{1}{3}$ miles from this fortification, in the scarped and rugged side of a rocky mountain, there is a cavern which, according to Khirghiz tradition, contains a treasure, consisting of precious metals and jewels of great value, deposited there by the Kalmyks after Amursana's outbreak against the Chinese, when they were obliged to seek refuge in Russian territory. This place is called "Kaima," *i. e.* treasure.

Between the Tarbagatai and the Saksan Mountains, near the source of the Cherga Rivulet, which discharges itself into the Nor-Zaisan, stand two forts of considerable size, at a distance of about $16\frac{2}{3}$ miles from each other. They are erected of rough stones, and show but few signs of dilapidation In the interval between these forts a stone wall, extending for 8 versts, has been erected. This place is called Kergen-tash.

In the Altaï Range, at 20 miles from the Upper Irtysh, and situated on the Bugula Rivulet which falls into the Belezek, large

and ruinous buildings may be observed, and to which the Kirghizes give the name of Sarly-tan. I did not succeed in getting any information respecting these buildings; but it must be supposed that they were erected by the Djungars, and abandoned by them on the overthrow of their dominion in 1757.

At the southern extremity of Makrana, an offshoot of the Tarbagatai Range, there are warm mineral springs, near which stands a Buddhist temple. Within a few years ago the Chinese had recourse to these springs for curing different maladies; but now, owing to the proximity of the Russians, they no longer frequent them.

Near the source of the Arasan-Koba Rivulet in the Altai, and close to Sart-tan Mountain, are two mineral springs which issue out of a small mound. This water is cold and as white as milk; it is also held in great esteem by the Chinese. The water of one spring is drank by men, and that of the other by women.

The neighbourhood of the Zaisan and that of the rivers which fall into the Upper Irtysh abounds in wild animals of different descriptions, such as tigers, leopards, lynxes, cats, bears, wolves, foxes, Corsac foxes, wolverines, badgers, beavers, martens, squirrels, Siberian weasels, moles, ermines, and others.

The population around Nor-Zaisan is distributed as follows:—

From Chuguchak along the western shore of the lake and the left bank of the Lower Irtysh (to the fortress of Ustkamenogorsk and along the rivulets running down from the Kolbinsk and Karatal Ranges) the Kirghizes who nomadise both in summer and winter in those localities are Russian subjects, and engaged, especially those occupying the course of the Bazarka, in raising crops for their own consumption, with the assistance of irrigation. They likewise rear cattle.

From the River Narym upwards, along both sides of the Irtysh and the right shore of the Nor-Zaisan as far as the River Kaljir, are the camping-grounds of the Kirghizes, under Chinese dominion. Along the left bank of the lake upwards from the Chinese pickets, and following the course of the Upper Irtysh to Uliungur Lake in the Tarbagatai Mountains, roam both in winter and summer the Kirghizes, who were formerly ruled by the famous Sultan Haiber Shaniaz, but who are now governed by his descendants.

All the Kirghizes who occupy both sides of the Irtysh and the circumjacent parts of the Lake Nor-Zaisan, strike their tents after the 13th of June and migrate with their herds, which are much harassed by the gadflies during the hot weather, to the Altai, where they encamp at the foot of the mountains on the broad and rich pastures of the valleys until the month of September. The Chinese Gobdinsk pickets are also removed at the same time, for

during the summer months all the Kirghizes abandon the Upper Irtysh, with the exception of a few who are left to guard the cultivated patches against the depredations of boars and herons. Mongols nomadise in the neighbourhood of the sources of the Ku and Ak-Irtysh, Suptu and Suptu-Kurt Rivulets. Near the sources of the Black Irtysh, Kran and Burchuk are the camping-grounds of Kalmyks of the Urunkhaits tribe. On the Tarbagatai Range, near the Saul-Tau, Kyzyl-Sdyr Mountains, and around Uliungur Lake, the country is occupied by Kalmyks of the Torgout tribe. They are all governed by Manchjur officials of different grades, such as Zaisans, Noyons, Taijis, Saloutchi, and Anbans, the highest in rank. A wooden house in the Chinese style has been built for the Anban in the steppe. This locality is resorted to in summer by many Kalmyks, mostly of the highest and richest class, with their families and cattle, and in this manner a regular town is formed round the Anban's house. The above Manchjur officials are sent in command of the pickets stationed from the River Kaljir to the town of Chuguchak, and to the similar line of pickets extending from Chuguchak past the western edge of Nor-Zaisan Lake. The object of these pickets is apparently not so much to guard the frontier as to prevent the Tartoul Kalmyks from crossing over into Russian territory. Each picket is commanded by a Manchjur officer and about twenty-five soldiers.

The road running near the Upper Irtysh, Nor-Zaisan, and along the right bank of the Lower Irtysh, is sufficiently good for horses, camels, and carts, with the exception of a few bad parts, which might easily be rendered passable. The Rivulets Kurchum, Kaljir, Koba, Burchun, and Kran, run across the road and are forded in springtime. Another road extends from the Krasnoyarsk redoubt along the left bank of the Irtysh to the Batavski pickets, where it joins the Chinese road. This latter runs past the Kulujinsk and Bukonsk pickets as far as the picket on the Bazarka Rivulet; from hence it proceeds along the left shore of the Nor-Zaisan Lake across Cherga Rivulet, past Kok-Tash Mountain to Uliungur Lake. This route is also passable for carts with moderate loads. Travellers may also proceed down the Cherga Rivulet running through a defile in the Tarbagatai Range, and which brings them to Chuguchak.

V.—*On the Basin of the River Mahanuddy.* An Abstract of the Geographical Portion of a Report by Mr. R. Temple, Chief Commissioner of the Central Provinces. 1863.

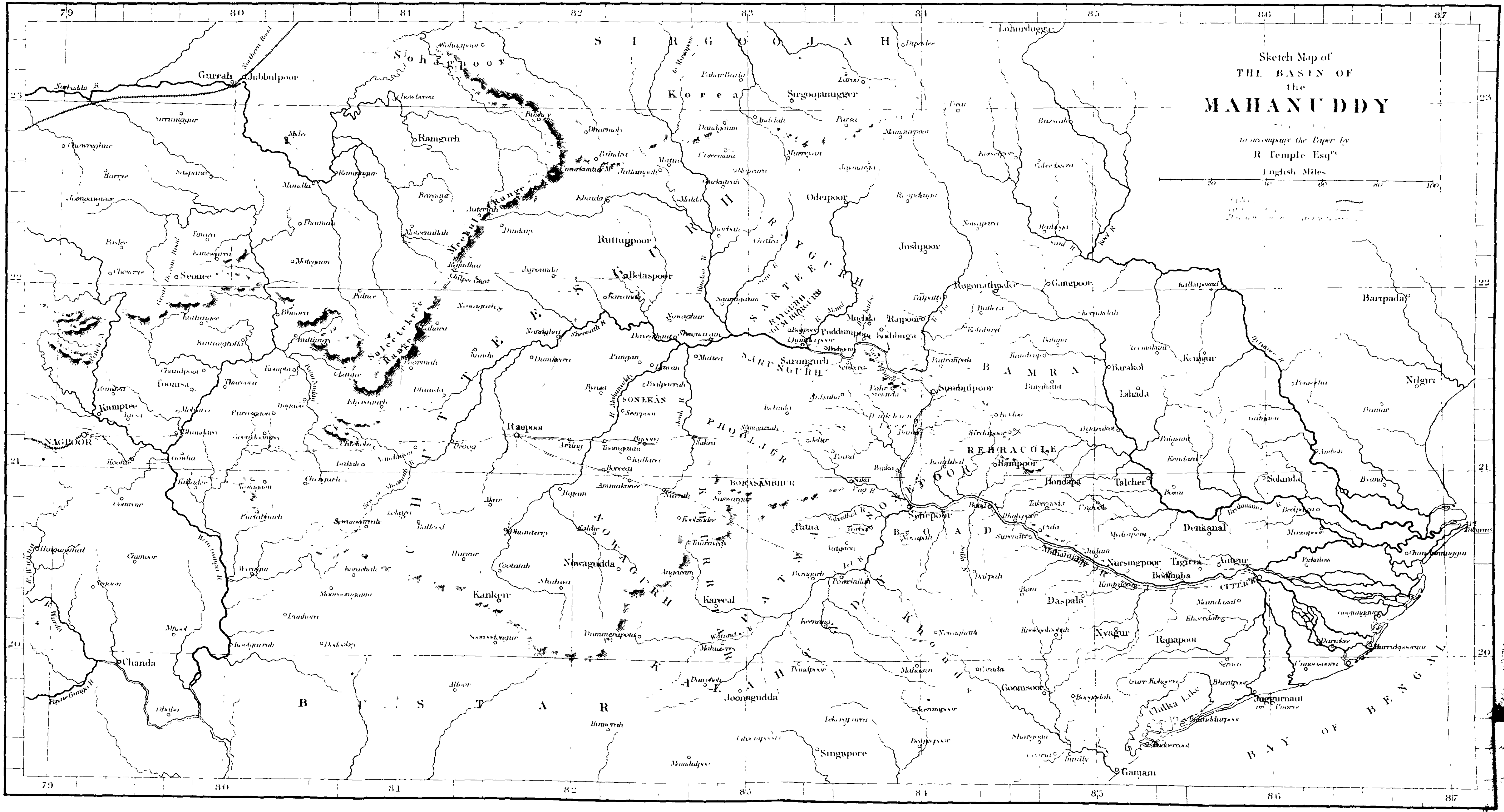
*Read*, Feb. 13, 1865.

Mr. Temple, Chief Commissioner of the Central Provinces, visited the Mahanuddy River and its tributaries during February, March, and April, of 1863, and wrote a general report on the region which they drain, in September.

The Mahanuddy River rises about 85 miles south of Raepoor, in a mountainous region which bounds the Chutteesgurh plateau on the south. This region is probably the wildest of all the wild parts of these provinces. From its source to a point called Sheonarain, the Mahanuddy is comparatively an insignificant stream, but near the latter place it is joined by three affluents—the Sheonath, the Jonk, and the Husdoo. The Jonk, which rises in the same hills as the Mahanuddy itself, is never navigated. The Husdoo, rising in the uplands of Sirgoojah to the north, flows nearly due southwards till it joins the Mahanuddy, and is navigated for about 30 miles above the junction. The Sheonath, up to this point, is a finer stream than the Mahanuddy. Rising in the range which separates Chutteesgurh from the Nagpoor country, it is navigated for the last 50 or 60 miles of its course.

From this point the Mahanuddy increases considerably in volume, and is quite navigable during the greater part of the year. After flowing for 60 miles in an easterly direction, it changes its course to the south near Puddumpoor, and enters a series of rocks which crop up all over its bed. Struggling through masses of rocks, it flows past Sumbulpoor, and at Sonepoor is joined by the River Tel, which has a course of 200 miles from the south. Here the Mahanuddy, taking an easterly course, pursues a tortuous way, confined and tossed about between ridges and crags of rock for many miles, till it reaches a place called Dholepoor, where its troubles come to an end; and, rolling its unrestrained waters along, it makes straight for the range of the Eastern Ghauts. Then it pierces the mountains by a gorge about 40 miles in length, slightly inferior in grandeur, but equal in beauty, to the gorge of the Godavery. There, overlooked by hills and shaded by forests on either side, it flows deep and quiet, navigable at all seasons. Emerging from the hills, it expands its bed and spreads itself over sands till it reaches Cuttack, where the Delta commences.

The distance from the point where the Sheonath commences to be navigable to Cuttack is 390 miles, of which 150 miles are navigable all the year round, and the rest for less than half the year. To this may be added 30 navigable miles of the Husdoo, and 150


Sketch Map of
THE BASIN OF
the
MAHANUDDY
to accompany the Paper by
R Temple Esqre
English Miles
SIRGOOJAH
Sohagpoor
Jubbulpoor
Gurrah
Ramgurh
Korea
Sirgoojanugger
Odeipoor
Jushpoor
Lohurdugga
Ruttunpoor
Belaspoor
Seonee
Kamptee
NAGPOOR
Toomsa
Raepoor
Sonekan
Sarungurh
Sumbulpoor
Rugonathpoor
Gangpoor
Baripada
Nilgiri
Barakol
Lahada
Bamra
Rehracole
Rampoor
Hondapa
Talcher
Sokanda
Denkanal
Sonepoor
Boad
Patna
Kareeal
Kanker
Nowagudda
Chanda
Bustar
Joonagudda
Singapore
Goomsoor
Daspala
Nyagur
Ranapoor
Nursingpoor
Tigiria
Attgur
Bodumba
Cuttack
Chilka Lake
Juggurnaut or Pooree
Ganjam
Bay of Bengal
Mahanuddy R
Nerbudda R
Kaunkurra
Ryegurh
Santee Ria
Phooljur
Borasambhur
Chandkee
Chowkee
Raugur
Mundla
Seonee
Nowagurh
Khond
Kalahundy
Dhuntern
Droog
Saleetekree Range
Mekul Range

o this may be added 50 navigable miles of the [illegible]

of the Tel. The total length of the Mahanuddy River system is 1410 miles, of which 690 are navigable.

Of the countries watered and drained by this great river-system the most important is Chutteesgurh, on the upper Mahanuddy, a vast flat plateau, open and cultivated, but surrounded on all sides by hilly and wooded tracts, which form distinct watersheds. The hills on the south side of the plateau are among the wildest of the wild tracts in the Central Provinces. From their southern face the waters tend towards the Godavery, and from the northern they run into the Mahanuddy.

The area enclosed by these mountain boundaries consists chiefly of plains, offering an enormous field for improvement. The plateau is called Chutteesgurh, which means 36 *Gurhs*, or subdivisions of territory. It was once ruled by a half-civilized Rajpoot dynasty, which had its capital at Ruttunpoor, in the northern part of the plateau, now chiefly remarkable for swampy tanks and interminable rows of mango-trees. From 1750 to 1854 Chutteesgurh was part of the Bhonsla kingdom of Nagpoor, and in the latter year the plateau was annexed to the British dominions.

The culture of cotton is fast increasing in Chutteesgurh, and in the season of 1862-63 there were 51,000 acres under cultivation, yielding 2,600,000 lbs. It is remarkable that, though situated in the midst of territories where forests are so abundant and overwhelming, the plateau of Chutteesgurh itself is so destitute of wood and shrubs that fuel has to be obtained from long distances. Owing to the vicinity of hills and forests all round the plateau, the rains are so regular and copious that droughts are unknown, and artificial irrigation is not attempted; so good and moist is the soil, that even sugar-cane can be raised without regular irrigation. But this plateau, so propitiously endowed by nature, is but an oasis surrounded by comparatively desolate regions. Though in itself rich, it is on all its four sides cut off from civilization. Its trade is out of all proportion small, as compared with the population and produce of the country. One consequence is that the produce, especially that of the cereals, is so superabundant beyond the demand of consumption on the spot, that in recent years the prices of produce used to be even four times less in Chutteesgurh than elsewhere, and the corn even rotted in the stacks for want of a sale. But for the last three years Chutteesgurh has been regarded as a granary for Nagpoor, Berar, and even for the Deccan, and the exportation of grain to the westward has consequently been very great.

The area of the plains of Chutteesgurh is computed at about 10,000 square miles, of which about half may be cultivated. The number of villages and towns is calculated at 7802, and the population at 1,548,155 souls, chiefly Hindoos of the lower classes,

with a sprinkling of Brahmins, Rajpoots, and Mahrattas. The population, generally, is the most ignorant imaginable; dark superstitions prevailed up to the most recent period, and even now there is difficulty in preventing men from maltreating and even murdering old women for witchcraft.

The hill-country to the south of the plateau is inhabited only by Gonds, and there is a hill named the Dullee Pahar, in this tract, which still has an unexhausted teak forest. The hill-district between the Mahanuddy and the Jonk River is chiefly remarkable for its *sal* forests, with which it is literally covered from end to end. The trees grow chiefly on the banks of the small streams which flow into the Jonk. There are also some teak-trees, and it is proposed to establish a teak-plantation in this tract, where the soil is good and appears suitable for its growth, and where the rivers Jonk and Mahanuddy will afford water-carriage for the timber. The hill-country to the north of Chutteesgurh is very wild, affording a variety of charming scenery, in many places being full of ravines and deep gorges, entirely covered with forests. The hills contain coal and iron. The whole territory is more or less covered with a vast *sal* forest of some 300 square miles in extent. There are several remarkable hills, some of which are crowned by old strongholds of the Rajpoot robber-chiefs, who formerly held this country. The most remarkable of these is Laafa Gurh, about 3300 feet above the sea. Its scarped sides, which are almost perpendicular, rise more than 1000 feet directly over the plain below, and the only means of access is a narrow pathway, defended by two massive stone gateways, with large bastions and towers.

Outcrops of coal are found in numerous places all over the Husdoo valley; narrow seams of bituminous coal, interspersed with thin bands of shale, and containing more or less sulphur. It burns fairly, and gives out a good amount of heat, and the natives use it partially for smelting the iron ore, which abounds all over these districts.

Below Chutteesgurh the Mahanuddy flows through the Sumbulpoor country and the Gurjât states, where its banks are, for the most part, under cultivation. The produce of the Sumbulpoor district consists of cotton, rice, pulses, castor-oil seed, linseed, sugar, and tobacco; but the soil is unsuitable for cotton.

The *sal* forests of this part of India are collected, as it were in one mighty belt. This belt commences in the plateau below the Kymore range, near the left bank of the Soane, spreads all over the Mundla Hills, clothes with wood and foliage the hills round the sources of the Nerbudda, fringes the northern frontier of Chutteesgurh, and covers the hills of all the districts of the Mahanuddy and its affluents, down to the Eastern Ghaut Mountains; then, striking across the Gurjat country, it approaches the source of the

Mahanuddy, and it is found in a valley of one of the affluents of the Godavery. Here at length it stops, having expanded luxuriantly over a length of 700 or 800 miles in all. The *sal* undoubtedly forms one of the most important natural resources of the Mahanuddy districts. The wood, when arrived at maturity, is possessed of great strength and durability, equal, indeed, to that of teak. It is very tough, and is even in its fibre. The great objection to it is that, being so full of sap, it cannot be thoroughly seasoned under about ten years. And until the wood is thoroughly seasoned it will not float, certainly not under eight years. If, however, the fermentable sap is diluted by immersing the logs in water, and then drying them in the shade, they will be sufficiently seasoned for building purpose in half the above period.

The number of navigable miles of the Mahanuddy and its tributaries may be stated at 690 miles; but over the larger portion of these the navigation is only open during the monsoon or rainy season, differing, of course, on the various portions of the river. From Cuttack for 150 miles up, however, the navigation is open throughout the year. About 200 boats are now employed in the traffic between Chutteesgurh and Cuttack, down the Mahanuddy, during the rainy season. The boats are all of a long, narrow, canoe-like shape, expressly constructed for dangerous and intricate navigation. The Mahanuddy permeates vast and productive regions, which are as yet isolated from the coast and from the chief marts of commerce. These great cultivated plateaux, these rich valleys, these surplus stores of cotton, sugar, grain, oil, seed, and fibres, these coal-fields and iron-mines, these boundless forests of timber-trees, are all locked up far inland, imprisoned among the mountains.

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## *On the Rainfall of the Mahanuddy Basin.*

By CAPTAIN HARRIS.

THE area of the whole basin of the Mahanuddy is 50,000 square miles, divided as follows:—

| | Miles. |
|---|---|
| Area of the main body of the basin .. .. .. .. | 40,000 |
| „ neck of the Delta .. .. .. .. .. | 3,750 |
| „ Delta proper .. .. .. .. .. .. | 6,250 |
| | 50,000 |

The body of the basin has a mean diameter of 225 miles, its centre is only 200 miles from the sea, and its farthest limit little more than 300 miles; so that the size of the basin is such that but a very moderately wide-spreading rain-storm is required to ensure rain falling on every square inch of area simultaneously. The form of the basin is that of an extremely round and compact body,

with a narrow neck and bell-shaped mouth, than which it is difficult to conceive one more calculated to empty itself rapidly, while the position is one of very close proximity to the sea, the source of rain-clouds. With these qualifications for filling and rapidly emptying itself, with steep and densely-wooded mountains encircling it, the Mahanuddy Basin is pre-eminently calculated to produce what are actually met with, namely, floods ranging extremely high, but of very brief duration.

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## VI.—*A Visit to the Ruined Cities and Buildings of Cambodia.*

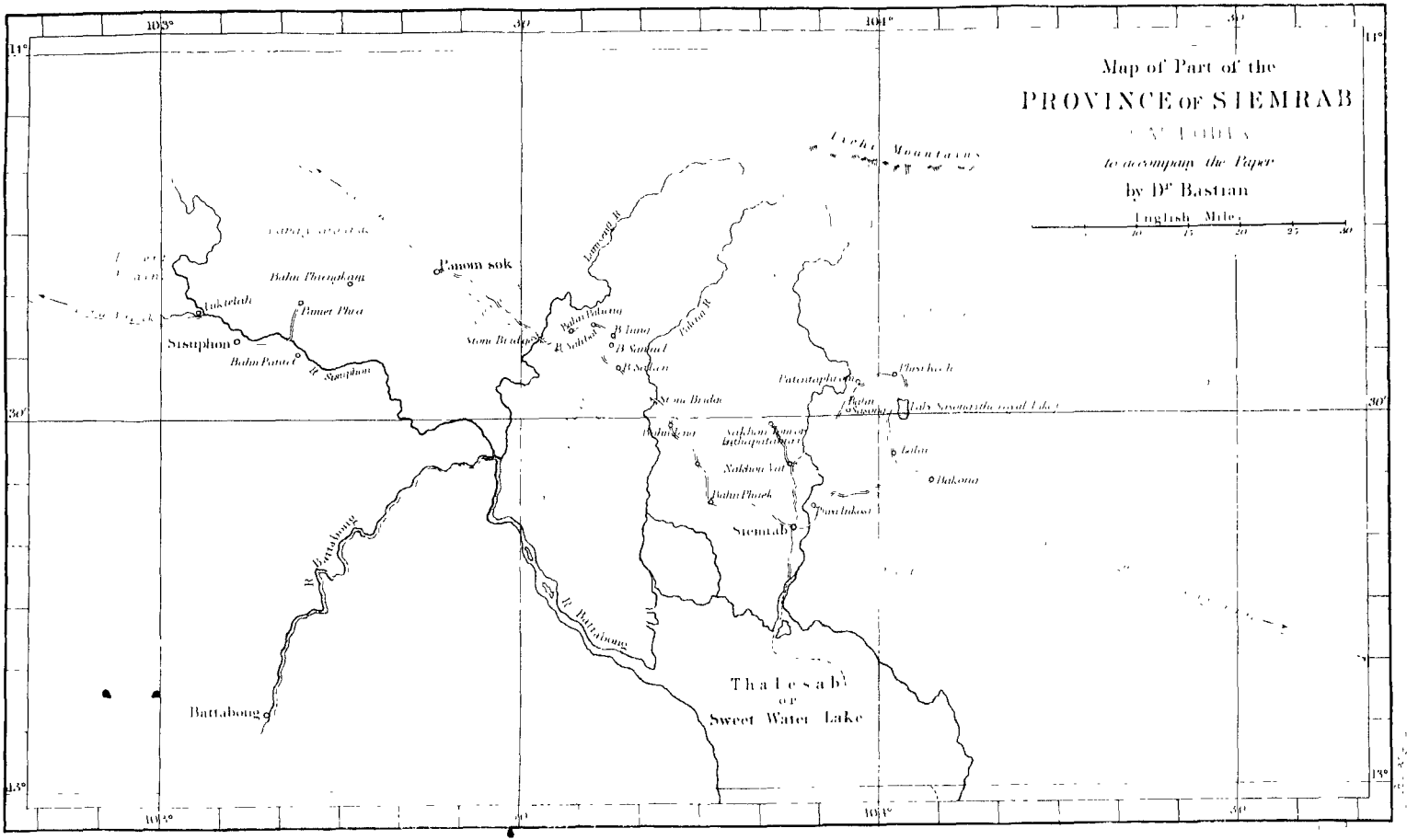
By Dr. A. BASTIAN.

*Read*, February 13, 1865.

THE principal ruins of Cambodia are concentrated in the province of Siemrab, although they are not confined to it, but scattered over a wide extent of the neighbouring country.

Coming from Bangkok, I left the road to Battabong at Tasavai or Sisuphon, and taking a north-easterly direction, arrived at Panom Sok, where the remains of an old palace can be traced. The ground there is low and swampy, and flooded during three months in every year. The whole country between Siam and Cambodia is an inclined plain, falling off to the sea from the Khao Donrek or highlands of Korat, which constitute the first platform of the terraces that ascend to the mountain-chains of Laos, and thence to the Himalaya. The Khao Donrek, or the "mountain which bears on the shoulder," *i. e.* the Atlas, encloses in its domains the Dong Phaya Fai (the jungle of the Lord of Fire), and gives rise to most of the tributary streams flowing to the Pachim River. Two days to the east of Kabin the watershed, between the Gulf of Siam and the outlets of the Mekhong, is passed, and the intervening space, before the basin of the Thalesab drains the valley of Cambodia, is converted into a lake every year during the rainy season. From August to November all voyages are made in boats; during the rest of the year the water becomes dry land, and the traveller, who then traverses these regions on a buffalo-cart or on elephants, may still see the boats, which had been afloat in the months of the rainy season and which await its return, lying about in forests and plains, where he, in March and April, suffers greatly from want of water. When I passed there in the month of December the two seasons were still contending for the mastery, and I found to my dismay the truth of what a Siamese nobleman had warned me of before my departure, namely, that the ground would not yet be dry enough for carts nor wet enough for boats. Often when toiling

of Siam, the only witnesses one meets to tell of the past are brick-


Map of Part of the
PROVINCE OF SIEMRAB
to accompany the Paper
by Dr Bastian
English Miles
Dangrek Mountains
Lamcang R.
Tonlé Sap R.
Siemrab
Battabong
R. Battabong
Thalesab
or
Sweet Water Lake

through these marshy swamps I looked wistfully up to a ridge which, at an elevation of 6 or 8 feet, ran high and dry through the low land, sometimes stretching along one side of the road, sometimes crossing it at right angles, to plunge into the depths of the forest and then to appear again, as if to mock our slow progress and invite us to bestride it and follow its course. This elevated ridge was the remains of the old highway of the Khamen-boran (ancient Cambodians), who built the stone monuments; and it can be traced, as the natives told me, from the neighbourhood of Nophburi (a large city of Siam, now nearly deserted) straight up to Nakhon Vat, from which place it continues to the centre of Cochin China, and none of the people I met with had seen its terminus.

Following the serpentine lines of the Indian path, I was put in mind of my wanderings in Peru, where the traveller, winding his way over a broken and intersected ground, climbing hills on one side to descend them on the other, and wading rocky streams brawling down precipitous valleys, sees above his head the remnants of the ancient road of the Incas, which leads along the level of the high plateau in a straight line to Cuzco, the capital. Chasms are spanned by magnificent stone bridges in Peru, and although the difficulties to be overcome in the lowlands of Cambodia cannot be compared with the wild and grand nature of the Andes, the stone bridges which these ancient Cambodians built over comparatively insignificant streams rival in the boldness of their conception and even surpass the Peruvian bridges, and seem to prove that their builders must have been a people accustomed to struggle with the obstacles of mountainous countries. Dwellers in the lowlands would scarcely have thought of raising such immense works to escape the water, which they rather seek for as their favourite means of conveyance.

The first indication of what I should have to witness in this mysterious land of ruins, met my view on the evening of the day on which we had left Panom-Sok. We were encamped in a clearing of the forest, near the banks of a small stream, called Lam-Seng by the Siamese, or Sthüng-Sen by the Cambodians, when the guide (given me by the Governor of Panom-Sok) asked if I should like to see the Taphan-hin (the stone bridge). I followed the path indicated, and at a place where the thick foliage of the forest pressed darkly round the foaming water of the stream, which falls there in cascades over a ledge of rocks, I saw stretched across it a colossal structure, 400 feet long and 50 feet broad, which, overgrown with grasses and weeds, was supported by thirty arched pillars built of huge stones. In traversing the countries of Ultra-India, in the vast ruins of Pegu and Ava, or in the ancient capitals of Siam, the only witnesses one meets to tell of the past are brick-

buildings, decayed and crumbling to pieces; but here I stood before a work built of stone, still uninjured and apparently almost as firm and strong as on the day of its first being placed there.

The bridge of the Lam-Seng is built of freestone, except the inferior layers of the pillars, for which a hard conglomerate is used wherever they are exposed to the action of the water. They are placed on a ledge of rocks which there lies across the river, and are riveted firmly in this natural foundation. The stones forming the pillars are of oblong shape and are laid in lines, with the broad side (6 or 8 feet) towards the river. The pillars stand in pairs, arching in opposite directions. At the basis the distance is about 6 feet; but the stones project gradually towards the top, inclining in an arch, which is thus closed after the manner of that of Mycenæ. The body of the bridge is formed by large stone beams, 14 feet or more in length, which stretch in several layers one above the other. The upper ones are placed alternately on the edges of the lower ones, and thus their very weight contributes to keep the arch steady. There was formerly a balustrade, which lined the bridge on both sides; but it is now mostly thrown down, these ornamental parts of the massive structure being the only ones on which the wanton destroyers could wreak their vengeance. It was composed of a series of long quarry-stones, on the edges of which Caryatidean pillars (representing Phaya Nakh, or the king of the subterranean serpents) supported another slab, with an excavation all along its rim, to receive in it a semi-convex stone, ornamented with arabesque sculptures. On the left bank of the river the staircase of a Ghaut leads down to the water, at a place where a temple is said formerly to have stood, and under a shed in a neighbouring part of the forest I found a collection of Brahminical idols, including four-handed Vishnu and Ganesa, with his elephant head, which had been placed there by their worshippers. In examining the San-Chao in Cambodia, which, like the Nat-houses in Birma and the Dewalas in Ceylon, in most cases adjoin a Buddhistic monastery, I have frequently found broken fragments of these and similar statues, together with offerings that have been laid before them. The Lam-Seng, at the time I saw it, had high and steep banks; but it is filled to the brim (according to native account) in the rainy season, when, the rocks which now form the rapids being covered, the stream runs smoothly along. Another stone bridge, called Taphan-theph (the celestial bridge), is said to exist a little farther up the river.

The next morning we passed over the bridge, with the roaring water below; but as soon as the natives reached the other side they again left the direction of the old causeway, to grope their way through narrow and muddy paths in the jungle. The afternoon of the same day we arrived at the ruins of another bridge over the Paleng River, which, according to popular tradition, was left un-

finished by the architects because the country was invaded by the enemy, who destroyed Nakhon Vat. This bridge is likewise of stone, and has, even in its imperfect state, outlived many centuries; whereas the wooden bridges along the military road, built lately by the Siamese general, Chao-Khun Bodin, from Pachim to Battabong, are even now, after hardly thirty years existence, out of repair or totally broken down.

The plan of the bridge over the Paleng is the same as that of the one previously described, the vaults being formed by layers of stone, projecting 4 to 6 inches beyond those beneath. The people told me of three other stone bridges, somewhere in the neighbourhood; but I did not see them on my way, as I found myself two days after in Siemrab, the government town of the province of the same name, and from thence started for the temple of Nakhon Vat, two hours distant.

The first impression this monument makes is overwhelming. It is Ellora's Kailasa, taken out of its dark cave and placed high in air, and the sculptures rival in their elegant and animated style the best of those at Mahabalipuram. The chasteness of the design recalls the classical style of Greece; but an examination of the details shows it to be mixed up with Indian extravagances, like the architecture of the Kashmirian temples.

As I am informed that the temple has been lately described in the Journal of the Royal Geographical Society, and as my notes are not as yet properly arranged, I shall confine myself to a few remarks upon the delineations on the walls of the outer corridor which encases the peristyles of the interior temple.

The sculptures are in high-relief, and the figures carved out of the walls are of about half the size of life, more or less. They shine, as if polished, on account of the frequent cleaning previous to their being overlaid with colours and gold leaf—an operation formerly repeated at every festive day in the year. In three passages of the corridor the subjects represented are taken from the Ramayana, an epic well known in translations throughout Birma and Siam, although differing in many particulars from the Sanscrit original. One sees Rama on Garuda, and Laksman on Hanuman, leading on their warriors against Rawana, with ten heads, and therefore called Thossakan. The bridge through the sea is built by the monkeys, and Rawana supplicates for the assistance of the Maha-Rüsi (chief of hermits), who sits with his trident in the posture of Siva. Thossarath (Dasaratha), Rama's father, challenges his enemy; Rawana fights the sun, &c. &c. All these subjects, here sculptured on stone, one may see painted in gaudy colours and more fantastic shapes in the royal Vats of Bangkok; but in Nakhon Vat are also met with the fabulous productions of Raxasi, Koxasi, many-headed serpents, monsters, angels, four or eight

handed deities, &c. &c. These are wanting, however, in a battle-scene of the adjoining verandah, which is taken from ordinary human life. In the battle called that of Phra-Phirut, the kings advance against each other on chariots, and many an animated contest, is depicted. One scene appears to belong to the Mahabharata, representing Bhima as placed on a litter of arrows by the Pandus; another seems to be the duel between Phaya Katong and Lakernana.

In the following compartment the whole length of the wall (240 feet) is occupied by the struggle between Thevadas and Yaksas for the Naga snake; the former, who are aided by Hanuman, dragging on the tail, the latter the head. In the middle stands Vishnu upon Kurma Raja, the world-supporting turtle. The same subject, a favourite one with the artists, I have seen repeated in several other places, chiefly as an ornamental sculpture for porticoes. At the Vat Phra-Inkosi, near Siemrab, Khinet comes to the scene, riding on a rat, and the snake only being carried points to a division of labour, as in the Manek Maya of Java, where the portage of the mountain and that of the snake-god are related as distinct events. At Vat Ek (near Battabong) the snake-god winds his folds round Mount Meru, or Mandara; and in a mythological history of Cambodia, which I translated in Bangkok, the same fact is alluded to.

The most interesting sculptures at Nakhon Vat are in two compartments, called by the natives respectively the procession and the three stages (heaven, earth, and hell). On the first, the king, Pathummasurivong, is seen returning from the foundation of the city, surrounded by his court and his wives, who are borne in litters. He is carried on in a long procession of his warriors (on foot or on horseback), each chief heading his followers on elephants. I counted above one thousand figures (or at least heads) in this single apartment. What gives a peculiar interest to this section is the fact that the artist has represented the different nationalities in all their distinctive characteristic features, from the flat-nosed savage in the tasseled garb of the Pnom and the short-haired Lao to the straight-nosed Rajaput, with sword and shield, and the bearded Moor, giving a catalogue of nationalities, like another column of Trajan, in the predominant physical conformation of each race. On the whole, there is such a prevalence of Hellenic cast in the features and profiles, as well as in the elegant attitudes of the horsemen, that one might suppose Xenocrates of old, after finishing his labours in Bombay, had made an excursion to the East. The Chinese Hiowen-thsang compared the straight noses of the Ceylonese to the beak of a bird, and the Cambodians are not less surprised at the prominent lineaments displayed in these sculptures, and so decidedly different from the flattened noses in

which they themselves, for the most part, rejoice. In the compartment called the three stages the natives believe they see the representation of heaven, earth, and hell; but I have reason to doubt this explanation. The lower stage, it is true, represents, on one half the world of Pretas, and on the other the different hells; but the two upper stages appear to give the history of the manner in which savage tribes were civilised by colonising foreigners, and must have reference to the foundation of these ancient monuments, the far-advanced outposts on the wild mountain-forests, which are visible from the windows when walking through the majestic colonnades. Those who refused the new religion offered to them were precipitated into hell, pictured below; whereas the re-born converts entered the palaces which appear on the upper stage, immediately above it, the middle one not being continued. Particulars of these instructive pictures I shall have to defer till the publication of the drawings illustrating them, which were executed by a native painter whom I had taken with me.

One subject which frequently recurs in these sculptures shows the head-dress of the rude barbarians being changed by the king, who adds flowers and ornaments. Females in a richly-adorned head-dress, called Thephakanja, or Chao Savan (dwellers in heaven), are sculptured (nearly in life size) on every part of the building. Forming the retinue of the deified kings, they correspond to the Widadaris of Javanese mythology: but they are designated by the Cambodians of to-day, in grateful remembrance of benefits received, as the benevolent or kind-hearted ladies. The varieties of the head-dress are manifold, but that which occurs most frequently towers up in three high points. The name of Ketsamalea, the father of King Pathummasurivong (of the race of the sun-born lotus), means, when translated, "the head adorned with garlands;" and the flowers used for these garlands are mostly the Champa-flower, the symbol of the kingdom of Champa, or Cham.

There are a great many inscriptions scattered all over the buildings at Nakhon Vat. Some of them are modern, written with Cambodian letters, and in the language now spoken by the people. Their purport is to describe the offerings made, and give the names of the worshippers. The other inscriptions are written in a character which likewise, for the most part, resembles the Pali (and therefore the Cambodian) letters, but in a more antiquated form, approaching that of the Kawi inscriptions, and sometimes deviating considerably. The language differs from the vernacular Cambodian, as well as from the Pali, and is not understood now. When the ruins were rediscovered in 1570 the inscriptions were already, as De Mancanedo remarks, unintelligible to the Cambodians. With the help of some priests in Udong, I have, however, succeeded in deciphering some names, and I am still busy with

them. The modern inscriptions every literate Cambodian can read. In one of the galleries a square tablet of black marble has been let into the wall, bearing an inscription, which my guides told me contained the history of the building. I had it copied, and as it was written in the common Cambodian, intermixed with some obsolete expressions, I had it read to me and translated, but found it only to contain a long description of offerings made by different donors, interspersed with some interesting allusion to mythological objects. The date was 1623 (probably of the Mahasakkharat).

The central of the five towers of the inner circle (in the temple at Nakhon Vat) forms an octagon with four larger and four smaller sides. On each of the four larger sides, opening out in gates, which face the four horizontal points, stands a large figure of Buddha, overlooking from its high position the surrounding country. This open exposure of the statues is the very counterpart to their concealment in vaulted cells at Pagan (where the statue in the Ananda temple is to be illuminated by artificial light from above), and in the rock-cut basilicas of the Dekkhan. This combination of four Buddhas occurs frequently in Cambodia, and is there called Phra-Muk-bueu (Phra-si-na in Siamese), or the Lord with four faces, although not only the faces but the whole bodies are four-fold, and Chatur-Baya (four-shouldered) would be more appropriate. If sculptured on the wall, three faces only can become visible; but if standing free, a fourth face is added to the Trimurti. A four-faced deity is worked out in gigantic proportions on the large gate of Nakhon Luang, and there called Phrohm (Brahma), signifying the protection given by the all-seeing god, which was afterwards transferred by the Buddhists to the four Pala. As this direction to the four points of the horizon naturally forms a cross, the Siamese call a crossing "phrahm;" and the Prasat (prasada), the distinguishing feature of these exotic stone monuments of Cambodia, forms always a cross, with the corridors dissecting each other at right angles. The cross is the distinctive character for the doctors of reason in the pristine Buddhism of Kasyapa. The corridors are roofed with blocks of stones, projecting over each other, so as to form an arch. Narrower arches are formed by the hollow of the covering stone, resting on two stones, in the form of a wedge. The blocks of stones are fitted together without cement, but leave scarcely a trace of their joinings; and the same is to be observed of some contemporaneous brick buildings, which are found (at other places) intermixed with the other stone ruins.

The edifices at Nakhon Vat were, as their name (city of monasteries) signifies, a temple built for the reception of the learned Patriarch Buddhaghosa, who brought the holy books of the Trai-Pidok from Langka (Ceylon). The residence of the kings at that time was the far-famed Inthapataburi, which is now, in its ruins,

called Nakhon Luang (royal city) by the Siamese, or Nakhon Tom (large city) according to the Cambodians, both languages having adopted the Pali word Nakhara. Its foundation is referred to a Prince of Romah or Ruma; but the story is too long to insert here.

Connected with the temple of Nakon Vat is the establishment of a number of villages inhabited by a people called Samre, on the neighbouring Khao (mountain) Liehi. Whenever some work is to be performed in the temple, the abbot sends a message to the mountains ($1\frac{1}{2}$ day distant), and the required number of labourers has to be sent by the head man. The nomination of the abbots, who were placed there after the rediscovery of the temple in the year 1570, is now in the hands of the governor of Siemrab. The custom to endow a temple with slaves was prevalent over the whole continent. There were pagoda-slaves connected with the Schwey-Dagon in Rangoon, and there are still slaves belonging to several pagodas in Birma Proper. In the latter country they were, however, mostly supplied by prisoners of war, Arracanese, Kassay, Peguans, &c. &c.; whereas the Samre belong to the aboriginal stock of the population, inhabiting most of the hills around the lake, and thence to Kampot.

Leaving the platform of the temple, which is fortified by broad moats and a stone wall, a two hours' ride through the forest brings us to the ruins of Inthapataburi, the ancient capital of Cambodia, now known under the name of Nakhon Luang, or Nakhon Tom. The ruins are very extensive, and from them were taken the stones which furnished the material to build the fort of Siemrab. The outermost of the three walls encloses a wide area, which, according to the natives, it would take a whole day, from sunrise to sunset, to circumambulate. The second wall was the fortification of the city proper; and then follows the central wall, the adamantine one (Kampeng Keoh), which contained the palace and the royal buildings, now to be traced in their ruins only. This system of three fortifications one within another, is a standing one in Ultra-India, but has recently been repeated by the Birmese in building their new capital. One enters the wall of Nakhon Tom, which is built with square blocks of iron conglomerate, through a massive structure, forming the gate, the upper part of which is worked at the four sides into a face of Phrohm. The Chinese traveller of 1295 mentions a five-faced Buddha, of stone, placed above the gates of the Cambodian capital. The space inside the wall is mostly overgrown with jungle, but here and there are some spots cleared for the planting of rice, or a bamboo hut is perched on heaps of rubbish, under which the stone and brick buildings of the old capital are buried. Large images of Buddha, of modern make, are put on some old foundations; but in the temple dedi-

cated to the protecting deity of the town, we find an ancient figure of the elephant-headed Ganesa.

In Siam every town has a larger or smaller chapel for the honour and the preservation of the Lak Myang (the town pillar), an injury to which would bring destruction on the citizens. The tree is still pointed out at Nakhon Tom, under which the leader of the emigration buried the golden umbrella (the emblem of royalty), and by this artifice got possession of the country, which had been before occupied by the Djam. The palace was situated on an eminence, and a staircase leads up to what remains of the second story. The corridors are in the same style as those in Nakhon Vat, but lower, and of a more rude workmanship, wanting the high finish and the elegance which distinguishes every part of the former. The figures also of men and animals which are sculptured on some of the walls, show a more primitive style of execution, bolder, but less graceful, and are probably older than those in Nakhon Vat. One of the finest specimens still preserved of these bygone times is the statue of the last king, Phaya Khi-ruen, or Phrabat Songkaya, who reigned in Nakhon Luang, and was afflicted with leprosy, for having deserted the snake-worship of his ancestors. A great number of stone inscriptions in the ancient characters, called Akson Mihng, are found at Nakhon Luang, on pillars and on the walls.

After having passed to the other side of the river of Siemrab, we encounter in the forest the ruins of two other places which present the same combination of a royal and priestly residence as the towns of Nakhon Luang and Nakhon Vat. The royal city bears the name of Paten-Taphrohm (the citadel of Ta-Phrohm), and the priestly one is called Prasat-Keoh (the gem-tower). The ancient kings removed to this place after the destruction of Nakhon Luang, and there still exists a long chain of traditions which connect the first and second period of Cambodian history. Distinct indications are given by the names themselves. The last king of Nakhon Luang lost his reign because he had erected the four-faced figure of Phrohm to keep off the snake-god, who till then had been the protector of the country, and the first king of the new capital is called the Ta-Phrohm (ancestor or grandfather Phrohm). This statue still stands in one of the corridors in a mutilated state, but sufficiently well preserved to show that the hair has been tied up in a knot at the top of the head, after the Brahminical fashion. One of the principal ornaments on roofs and balconies is the vigorous figure of Kruth (Garuda), the inveterate enemy of the Nagas, tearing a viper in his hands. The outer wall of Paten-Taphrohm is only a mound of earth, but the two inner circles are built of stone. A line of passages and doorways leads up to the palace, composed of an intricate labyrinth of low and narrow corridors, enclosing small

courts, and running out in turrets at the ends between a convolute of chambers in different sizes, and filled with clusters of pilasters. Most of the columns are richly ornamented, and on each of the portals is sculptured a scene referring to some event in Hindu mythology. The whole pillar is often a mass of sculpture from base to capital. The style of architecture is less colossal than that of Nakhon Luang, but the ornamental part approaches in elegance the masterpieces which embellish Nakhon Vat, and, as in this latter place, the honeysuckle border everywhere decorates the columns by which the pointed arch is supported. The columns are clothed with arabesques, which have been carved out of the stone, and mostly enclose in their curvatures the representation of a Rüsi, a Thevada, or a Thephanom (a figure frequently mistaken for a Buddha). The palace at Paten-Taphrohm was surmounted by thirty-five towers, some of which are still standing, but most of them lie in ruins. The stones are not so much hewn, as really polished, and they fit together without mortar. The spires on the roof stand in groups of five, forming a Pancha-Prasada, like the ancient buildings ascribed by the Malays to their Hindu princes.

Prasat-Keoh, the adjoining temple-monastery of Paten-Taphrohm, stands on a broad flat hill, to the summit of which lead several flights of steps under covered passages. The forest has here reclaimed its own, and destroyed the work of human hands. So densely has the luxuriant jungle shot up in this formerly cultivated place, that for every step forward a path has to be cleared by a cutlass. The plan of the building is that of a cross. Four turrets, with gates at the four points of the horizon, surround a fifth one; and each of these turrets opens again in four gates, placed at right angles. The temples, as well as the broad terraces on which they stand, are composed of large stones, which, although consisting for the most part of hard slate, are as neatly fitted together as the soft greystone of Nakhon Vat. Ornaments are very sparingly used, and sculptures of men or animals entirely wanting. The temple is said to have contained the famous image of a single emerald, or more likely of jadestone, like the present one, called Phra-Keoh, about which a great number of wild legends are current in Siam and Cambodia, originating, perhaps, in the remembrance of the wonderful jasper image of Ceylon, which was carried by the priestly sculptor, Nanteh, overland to China, in the fifth century, and carefully preserved. The arrival of Nantha, Anon, or Ananda, plays still an important part in the traditions of the Cambodians, who distinguish him very well from Gautama's favourite-disciple of the same name. The original of the Phra-Keoh was, perhaps, the jasper image of Ceylon, described

still by Fa-Hian, which had already attracted the attention of the Chinese in the first century.

In the neighbourhood of Phra-Keoh is an artificial lake, called Sasong (the royal lake), which was built by the kings of Paten-Taphrohm for their recreation, and surrounded by pleasure-houses. It is now covered with lotus and aquatic plants, but still supplies the villages scattered through the forest with water, as there is no other near. It must have been a work of immense labour, and fills the beholder with doubtful wonder when he compares these witnesses of former centuries with the present state of the country. The whole population of Cambodia of to-day would scarcely be able to raise one of these gigantic structures which abound in ruins. The Birmese lake of Oungbinleh comes in no way near to that of Sasong, which may, perhaps, be placed by the side of the Ceylonese works of irrigation. The lake of Sasong is of oblong shape, about 2000 feet broad, and 4000 feet long, and surrounded by a high embankment of solid masonry. Some of the blocks are 14 to 16 feet long, and highly finished. In convenient places square platforms were built, overhanging the water, with broad flights of steps leading down to it; and on such places the huge masses of stones laid on each other are embellished by delicate chisellings, bearing the figures of serpents, eagles, lions (in their fabulous shapes, as Naga, Kruth, Sinto) on the ends. In the middle of the lake is a small island, with the remains of a former palace upon it. Of all the figures used for ornaments, that which recurs most frequently is that of the Naga; and the Chinese officer who visited Cambodia in 1295, describes already "the pillars of the stone bridges adorned with serpents, each of which had nine heads."

Returning to Siemrab, on the left hand of the river, I passed two other remains of antiquity, Lailan and Bakong, both of them now converted into convents; that is to say, the priests have built their low and tottering cells between these splendid ruins, which they were not able to repair. At Lailan a large square platform is supported by three terraces of cut stones, ascending one above the other, on the highest point of an inclined plain, which stretches away from these to low grounds on the bushy horizon. In the height of the rainy season these are covered with water; and on this lake boat-races and boat-fights were annually held, as tradition says, the kings of Inthapataburi looking on from the terrace of Lailan. A similar contrivance existed at Amarapoora, in Birma. The stones of which the terraces of Lailan are composed are huge blocks, symmetrically cut, and joined together with great accuracy. A broad flight of steps, guarded by lions, leads up from the side on one abutment. Upon the platform stand in

two lines four Prasat, built up with bricks upon the freestone, which forms the fundament and the lower stage. The bricks are exceedingly hard, and made in a manner not understood now by the people of the country. They are polished, and laid upon each other in so neat a manner that no traces of mortar can be discovered. The folds of the stone gates are covered with intricate carvings of reticulated ornaments, great care being be-towed on even the minutest portions of the design, and, in the niches adjoining, statues of warriors stand sentinels. The surface of the stone which forms the portal is in every case elaborately sculptured, to present one scene or other of mythological import. The most magnificent inscriptions I have ever seen cover the door-posts from top to bottom, in a nearly perfect state of preservation. The letters are three-quarters of an inch large, and cut half an inch deep into the hard stone. Another stone inscription is found on both sides of a flat stone set upright.

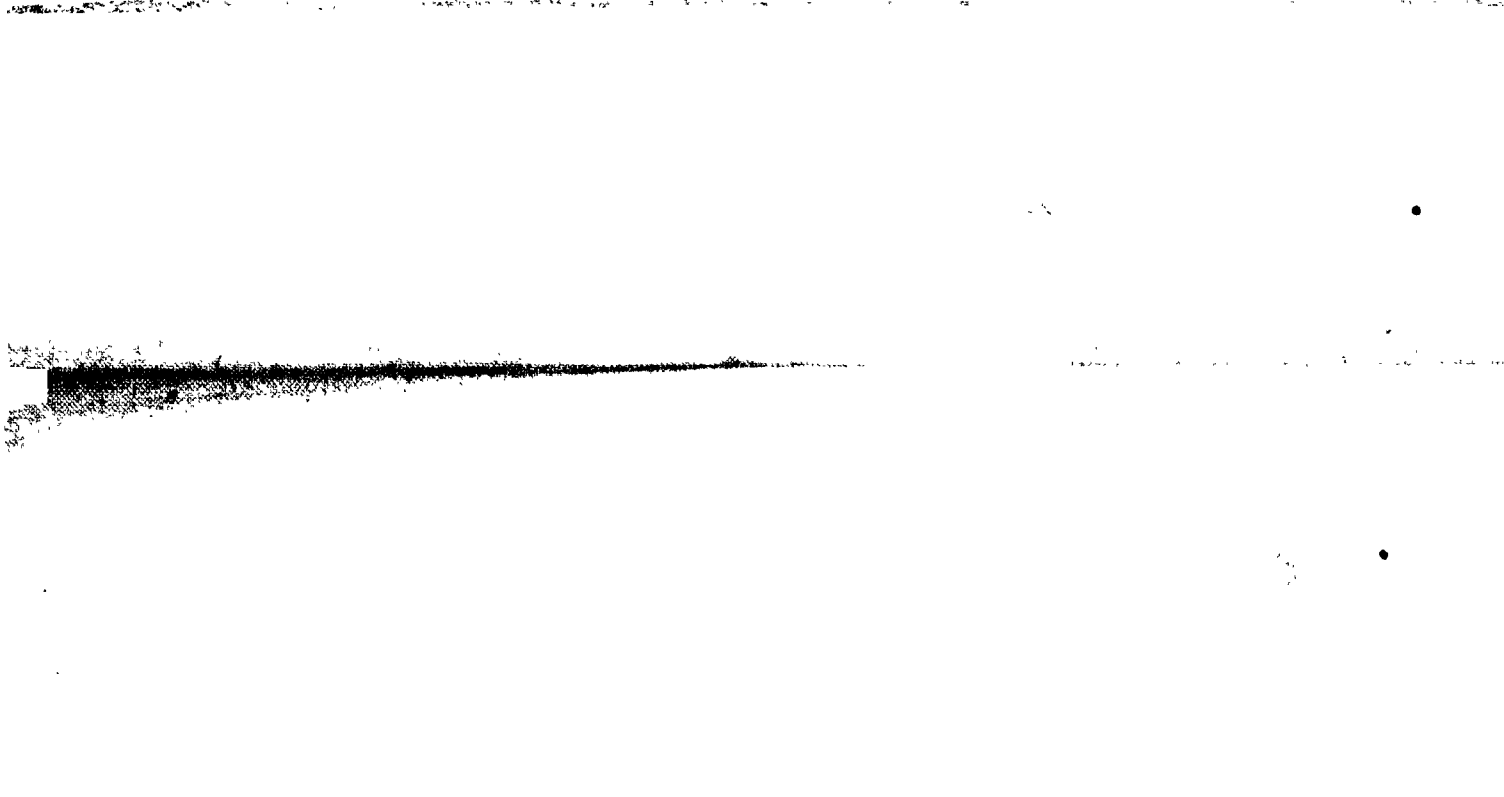
The most interesting feature at Bakong, at one hour's distance from Lailan, is a high hill, built up artificially upon a natural basis, in the style of the Mexican Teocalli. It rises in terraced lines, and bears the remains of a square altar upon its level platform, where a wide view opens out over the surrounding country. The foot of the truncated pyramid is surrounded by ten Prasats, most of them with pedestals inside, on which the statues of the gods were formerly placed. These are wanting now, but some of them are heaped up in an idol-house close by. Mutilated figures of elephants, lions, and dragons stand on the steps, and the stone gates are embellished with ornamental designs of arabesques, in the same way as at Lailan. In the carvings of the portal-stone, the central place is always occupied by a Gorgon-head, or the face of a Rakhsaka, called, on account of this peculiar form, Rhea by the Siamese and Cambodian artists. This is sometimes identified with Rahu, or, according to Cambodian *savans*, with Rembu Chulung, whose head, when cut off by Vishnu's Chakr, had already imbibed the immortalizing liquor. It resembles somewhat the hideous mask on the calendar stone at Mexico, and in the sculptures at Palenque. Bakong was built for the reception of the Phra-Kho (the Holy ox, or the Lord-ox), which, associated with Phra-Keoh (the Holy Gem, or the Lord of the Gem), is continually alluded to in Cambodian history. As the Chinese in the middle ages, after Brahminical rites had been introduced by the Tamulians, remarked of the kings in Ceylon, that they looked with equal reverence on the ox and on the images of Buddha, so it was with the kings of Cambodia, and even now-a-days the form of Siva's bull lies on the sacred hill of Udong, at the feet of the temple of Gautama, whose symbol was the ox. In the 'Syara Malaya' it is said that the people never ate the cow nor

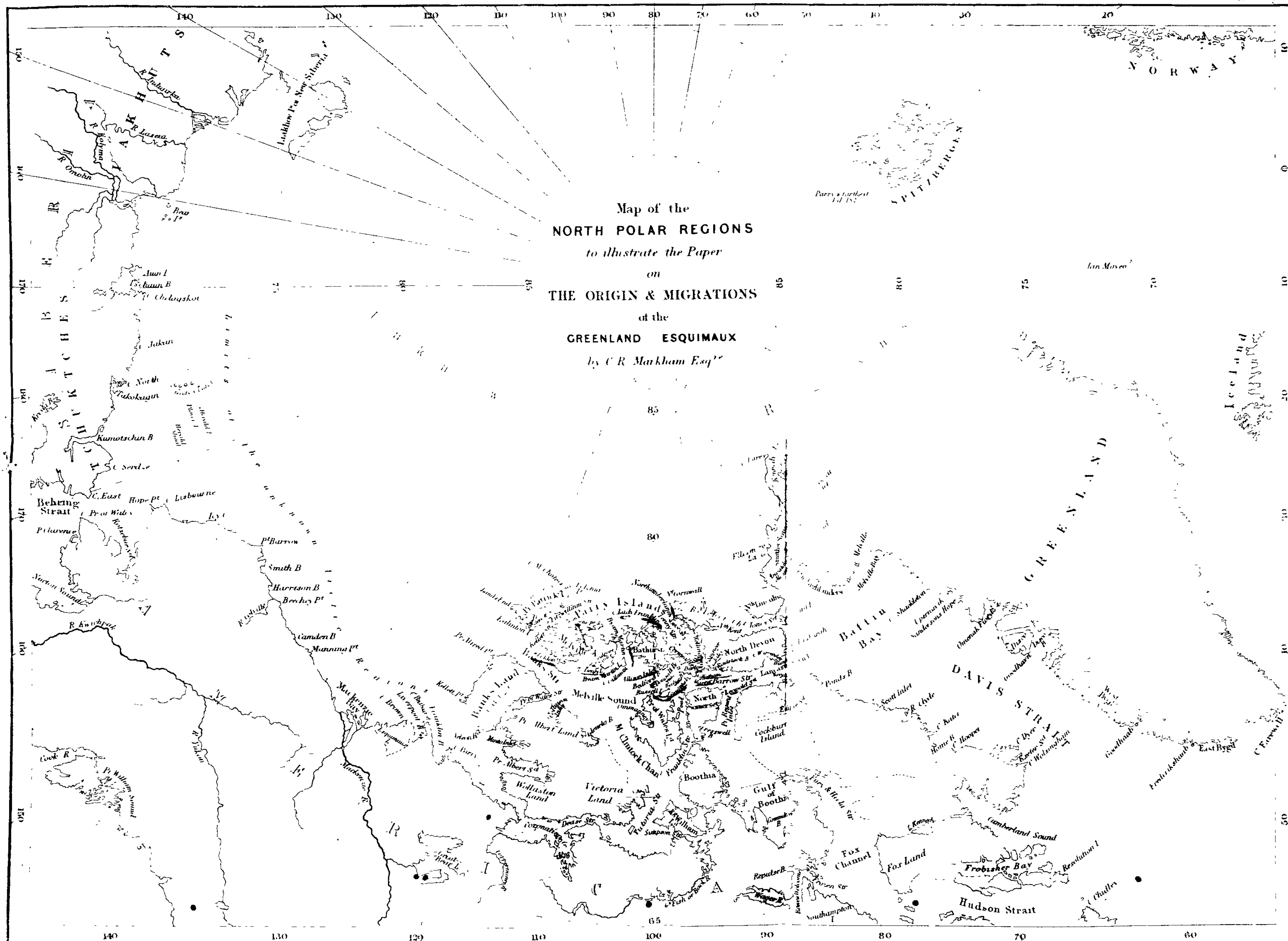
killed it. The Buddhistic priests, to conceal the fact that the ox had been worshipped, are accustomed to say that it was used as a library, and kept in reverence on account of the holy books placed in its belly. I found no inscription at Bakong.

Of the ruins which I visited after having navigated the Thalesab, in the province of Battabong, I will only mention those of Vat Ek, which consist of a monastery, rising on a square platform formed by stone terraces above the swampy grounds surrounding it; Banon, which forms a fortified temple on the top of a steep hill amongst wild and romantic scenery; and Basek, which was formerly a royal residence, with considerable remains of walls, palaces, temples, lakes, houses, and streets, all built or paved with stone, and in some places repaired with bricks. Sometimes, to strengthen the structure, beams of a hard kind of iron-wood (chiefly at Vat Ek) are fixed into the masonry, but in such a way as only to become visible after the outer stones have fallen down by some accident. The Cambodians who accompanied me thought that some of the great slabs were not natural, but manufactured on the spot; and I remember to have seen such an opinion proffered about some ancient temples in Assam, as, for instance, the stone pillars at Dhemalpoor. Of the immense rocks which enter into the construction at Nakhon-Vat, tradition says that they had first been soft, and by some process hardened after being placed there. The guides point to the traces of the fingers which the gods, when they removed the rocks, left on the stones, taking for such the large holes which originally served to insert the fastenings of the lead or other metals with which the building was roofed, or for the machinery to hoist them up. According to the Chinese account in the 13th century, the palace of the Cambodian king was partly tiled with lead, and partly covered with yellow bricks.

Inscriptions are only found in Basek and Vat Ek, not in Banon, but the ornamental sculptures on portals, gates, and columns are equally exquisite on the three places. Banon was formerly, as it is said, the seat of Brahminical rites, and there are now families of Brahmins settled in Cambodia, as well as in Siam and Birma, chiefly as astrologers in the royal service. They have an alphabet of their own, copies of which I have procured, but the letters bear little resemblance to those of the inscriptions. Amongst the statues frequently occurs that of a mace-bearer, in the form of the popular hero Ko-tabong, whose mace (tabong) disappeared (both at Battabong, written wrongly Phra-Tambong by the Siamese.

The natives enumerated many other towns which, according to their account, contain ancient ruins in bricks and stones, and it appears that they are spread over the whole valley of the Mekhong as far as Laos, but as their relative position could only be understood on an accurate map, I limit the catalogue to two communi-






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tions, which were given me on reliable authority. As the second king of Siam told me, there are some stone ruins at Phimai, near Raxa-sema, the capital of the province Korat, built on the model of the temple of Nakhon Vat, but in smaller dimensions. The king had not visited Nakhon Vat himself, as there prevails a mysterious fear throughout Siam and Cambodia to approach this hallowed spot, but several of his people who accompanied him to Phimai had been at Nakhon Vat, and were struck by the resemblance. A French missionary who had passed several years amongst the savage tribe of the Sthieng, described to me extensive stone ruins which exist on the island of Kosatin, on the Mekhong, three days upwards from Panompen. They consist of four large towers, ornamented with sculptures, and have an ancient kind of letters inscribed on them (very likely the Akson Mihng, as in the other places). At Udong I saw in the principal Vat two inscribed stones, which had been brought from some ruins halfway on the road to Kampot.

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## VII.—*On the Origin and Migrations of the Greenland Esquimaux.* By CLEMENTS R. MARKHAM, Esq., Secretary R.G.S.

*Read*, February 27, 1865.

THE attention of the Geographical Society has now been drawn, by Captain Sherard Osborn, to the great question of North Polar Exploration.* Our gallant associate has pointed out the route that should be taken by an expedition to explore the region round the Pole, the means that should be adopted for securing its success, and the vast importance of the scientific results likely to be derived from such an expedition. The proposal has touched a chord which vibrates through the hearts of the countrymen of Drake and Raleigh with answering sympathy. In this and other kindred scientific Societies it will meet with warm support as a matter of course, and even from Scandinavia and Germany have come kindly words of encouragement. As one of Captain Osborn's numerous correspondents assures him, "there are numbers of whom you will never hear who heartily wish you success." The time is yet far distant when England's sons shall have become indifferent to geographical discovery; and the widest field for such discovery—the field, too, which has afforded some of the most glorious opportunities of distinction for our naval worthies—lies within the Arctic circle. In this region—in spite of the fruitful labours of the explorers who

* See 'Proceedings' R. G. S., vol. ix. p. 42 *et seq.*, for report of Captain Sherard Osborn's paper, and the discussion which followed its reading.

have from time to time, for three centuries, navigated its seas and examined its coasts—there is still an enormous extent of land and sea entirely unknown to Europeans. It is scarcely necessary to add that these unknown regions lie chiefly within 80° of north latitude, and between the westernmost of the Parry Islands and Siberia.

An expedition to the North Pole will advance every branch of science, and will enrich the store of human knowledge generally. Its geographical discoveries will only be one out of the many valuable results that will be derived from it; but, as geographers, we may well look forward with deep interest to the rich harvest that will be reaped by our science, and take a preliminary survey of the additional knowledge that may be in store for us. It should be remembered that, though only one-half of the Arctic regions has been explored, yet that throughout its most desert wastes there are found abundant traces of former inhabitants where now all is a silent solitude. Those cheerless wilds have not been inhabited for centuries, yet they are covered with traces of the wanderers or sojourners of a by-gone age; and, as I shall endeavour to show, the unexplored regions far to the north, even up to the very Pole itself, may not improbably be at this moment supporting a small and scattered population. The wanderings of these mysterious people, the scanty notices of their origin and migrations that are scattered through history, and the requirements of their existence, are all so many clues which, when carefully gathered together, will assuredly tend to throw some light on a most interesting subject. The migrations of man within the Arctic zone give rise to questions which are closely connected with the geography of the undiscovered portions of the Arctic regions—questions which can only be solved by a scientific Polar expedition, but which may very properly, in the meanwhile, be discussed by geographers and ethnologists. The origin and history of the Esquimaux of Greenland, and especially of those interesting people on the northern shores of Baffin's Bay, who were named by Sir John Ross the "Arctic Highlanders," are topics serving to illustrate one of the numerous points which will engage the attention of the proposed expedition, and, at the same time, they may throw some passing light on questions in Arctic physical geography which still remain unsolved.

Until within the last nine centuries the great continent of Greenland was, so far as our knowledge extends, untenanted by a single human being—the bears, reindeer, and musk-oxen held undisputed possession. There was a still more remote period when fine forests of exogenous trees clothed the hill-sides of Disco, when groves waved, in a milder climate, over Banks's Land and Melville Island, and when corals and sponges flourished in the now frozen waters of Barrow's Straits. Of this period we know nothing; but it is at

least certain that when Eric the Red planted his little colony of hardy Norsemen at the mouth of one of the Greenland fiords, in the end of the tenth century, he found the land apparently far more habitable than it is to-day.

For three centuries and a half the Norman colonies of Greenland continued to flourish; upwards of 300 small farms and villages were built along the shores of the fiords from the island of Disco to Cape Farewell * (for the persevering Danish explorer Graah has satisfactorily shown that the East and West Bygds were both on the west coast),† and Greenland became the see of a Bishop. The ancient Icelandic and Danish accounts of these transactions are corroborated by the interesting remains which may be seen in the Scandinavian museum at Copenhagen. During the whole of this period no indigenous race was seen in that land, and no one appeared to dispute the possession of Greenland with the Norman colony.‡ A curious account of a voyage is extant, during which the Normans reached a latitude north of Barrow's Strait; yet there is no mention of any signs of a strange race. The Normans continued to be the sole tenants of Greenland, at least until the middle of the fourteenth century.

But Thorwald, the boastful Viking, who sailed away west from Greenland and discovered America,§ did meet with a strange race on the shores of Finland and Markland, which probably correspond with modern Labrador. Here he found men of short stature, whom he contemptuously called Skrœllings (chips or parings), and some of whom he wantonly killed. Here, then, is the first mention of the Esquimaux. At this period (the eleventh century) they had probably spread themselves from Northern Siberia, the cradle of their race, across Behring's Straits, along the whole coast of Arctic America, until they were stopped by the waves of the Atlantic. The hostility of the Red Indians was an effectual barrier to their seeking a more genial home to the south. They were not likely to wander towards the barren and inhospitable north, any more than their descendants do to-day; and they had no inducement to trust themselves in their frail *kayaks*, or *omiaks*, on the waves of the Atlantic. They assuredly never crossed over to Greenland by navigating Davis Strait or Baffin's Bay. This, as I believe, is the southern belt of Esquimaux migration; but it is with the Greenland Esquimaux that we have now to do, who had had no communication with their southern brethren since their ancestors hunted together on the frozen tundra of Siberia, and who, after centuries of wanderings along wild Arctic shores and in regions still unknown, first make their appearance in Greenland, coming down from the north.

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* Egede. † Graah's 'Greenland,' Introd. and p. 163.
‡ Crantz, i. p. 257. § Ibid.

Our last historical glimpse of the Norsemen of Greenland shows them living in two districts, in villages along the shores, with small herds of cattle finding pasturage round their houses, with outlying colonies on the opposite shores of America, and occasional vessels trading with Iceland and Norway; but no grain would ripen in their fields. They seem to have been a wild turbulent race of hardy pirates, and their history, short as it is, is filled with accounts of bloody feuds. All at once, in the middle of the fourteenth century, a horde of Skrœllings, resembling the small men of Finland and Markland, appeared on the extreme northern frontier of the Norman settlements of Greenland, at a place called Kindil's Inlet.* Eighteen Norsemen were killed in an encounter with them; the news of the invasion travelled south to the East Bygd; one Ivar Beer came to the rescue in 1349, and he found that all the Norsemen of the West Bygd had disappeared, and that the Skrœllings were in possession. Here the record abruptly ceases, and we hear nothing more of Greenland until the time of the Elizabethan navigators, and nothing authentic of either Norsemen or Skrœllings until the mission of Hans Egede, in the middle of the last century.

When the curtain rises again all traces of the Norsemen have disappeared, save a few Runic inscriptions, extending as far north as the present settlement of Upernavik, some ruins, and the broken church-bells of Gardar. The Skrœllings, or Esquimaux, are in sole possession from Disco to Cape Farewell. And the ancient Norse records are fully corroborated by the traditions of the Esquimaux, in the statement that they originally came from the north. Like all the Mongolian races, the Esquimaux are careful genealogists; Krantz tells us that they could trace back for ten generations;† and the story handed down from their forefathers is that they reached Southern Greenland by journeys from the head of Baffin's Bay.

The interesting question now arises—whence came these Greenland Esquimaux, these *Innuit*, or men, as they call themselves, and as I think they ought to be called by us? They are not descendants of the Skrœllings of the opposite American coast, as has already been seen. It is clear that they cannot have come from the eastward, over the ocean which intervenes between Lapland and Greenland, for no Esquimaux traces have ever been found on Spitzbergen, Iceland, or Jan Mayen. We look at them and see at once that they have no kinship with the red race of America; but a glance suffices to convince us of their relationship with the northern tribes of Siberia. It is in Asia, then, that we must seek their origin, that cradle of so many races, and the search for some clue to their origin is not altogether without result.

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* Crantz, i. p. 258. † Ibid., p. 229.

During the centuries preceding the first reported appearance of Skrœllings in Greenland, and for some time previously, there was a great movement among the people of Central Asia. Togrul Beg, Zengis Khan, and other chiefs of less celebrity, led vast armies to the conquest of the whole earth, as they proudly boasted. The land of the Turk and the Mongol sent forth a mighty series of inundations which flooded the rest of Asia during several centuries, and the effects of which were felt from the plains of Silesia to the shores of the Yellow Sea, and from the valley of the Ganges to the frozen tundra of Siberia. The pressure caused by these invading waves on the tribes of Northern Siberia drove them still farther to the north. Year after year the intruding Tartars continued to press on. Sheibani Khan, a grandson of the mighty Zengis, led fifteen thousand families into these northern wilds, and their descendants, the Iakhuts, pressed on still farther north, until they are now found at the mouths of rivers falling into the Polar Ocean. But these regions were formerly inhabited by numerous tribes which were driven away still farther north, over the frozen sea. Wrangell has preserved traditions of their disappearance, and in them, I think, we may find a clue to the origin of the Greenland Esquimaux.

The Iakhuts, it is said, were not the first inhabitants of the country along the banks of the river Kolyma.* The Omoki, a tribe of fishermen, the Chelaki, a nomadic race possessing reindeer, the Tunguses, and the Iukahirs were their predecessors. These tribes have so wholly disappeared that even their names are hardly remembered. An obscure tradition tells how "there were once more hearths of the Omoki on the shores of the Kolyma than there are stars in an Arctic sky."† The Onkilon, too, once a numerous race of fishers on the shores of the gulf of Anadyr, are now gone no man knows whither. Some centuries ago they are said to have occupied all the coast from Cape Chelagskoi to Behring's Straits, and the remains of their huts of stone, earth, and bones of whales are still seen along the shores.‡ The Omoki are said to have departed from the banks of the Kolyma in two large divisions, with their reindeer, and to have gone northward over the Polar Sea.§ Numerous traces of their *yourts* are to be seen near the mouth of the Indigirka. The Onkilon, too, fled away north, to the land whose mountains are said to be visible from Cape Jakan.

Here we probably have the commencement of the exodus of the Greenland Esquimaux. It did not take place at one time, but spread over a period of one or two centuries. The age of Mongol invasion and conquest was doubtless the age of tribulation and

* Wrangell, p. 171. † Ibid., p. 53. ‡ Ibid., p. 358. § Ibid., p. 181.

flight for the tribes of Northern Siberia. The Khivan genealogist Abulghazi tells us that when Ogus Khan, a chief belonging to the conquering family of Zengis, made an inroad into the south, some of his tribes could not follow him on account of the deep snow.* They were called in reproach *Karlik*, and this very word, in its plural form of *Kerálit*, is the name which the Esquimaux of Greenland give themselves; but I do not attach any weight to this coincidence.

The ruined *yourts* on Cape Chelagskoi mark the commencement of a long march; the same ruined *yourts* again appear on the shores of the Parry group—a wide space of 1140 miles intervenes, which is as yet entirely unknown. If my theory be correct, it should be occupied either by a continent or by a chain of islands; for I do not believe that the wanderers attempted any navigation, or indeed that they possessed canoes at all. They kept moving on in search of better hunting and fishing grounds along unknown shores, and across frozen straits, and the march from the capes of Siberia to Melville Island doubtless occupied more than one generation of wanderers.

There is some evidence, both historical and geographical, that the unknown tract in question is occupied by land. A chief of the Tchuktche nation told Wrangell that from the cliffs between Cape Chelagskoi and Cape North, on a clear summer-day, snow-covered mountains might be descried at a great distance to the north.† He maintained that this distant northern land was inhabited, and added that herds of reindeer had been seen to come across the frozen sea, and return again to the north. The Tchuktches also spoke of a much more northern land, the lofty mountains of which were visible on very clear days from Cape Jakan.‡ Wrangell himself never saw this mysterious land, and the Tchuktches were hardly believed until it was actually re-discovered by Captain Kellett, in the *Herald*, in 1850. In August of that year he sighted an extensive and high land to the north and north-west of Behring's Straits, with very lofty peaks, which he believes to be a continuation of the range of mountains seen by the natives off Cape Jakan.§ There are geographical reasons, which have been pointed out by Captain Osborn, for the supposition that land, either as a continent or as a chain of islands, extends to the neighbourhood of the westernmost of the Parry group. The nature of the ice-floes between the north coast of America, off the mouths of the Colville and Mackenzie, and Banks Island, leads to the conclusion that the sea in which such ice is formed must be, with the exception of some narrow straits, land-locked. The Esquimaux of this part of

* Strahlenberg. † Wrangell, p. 326. ‡ Ibid., p. 342.
§ Osborn's 'North-West Passage,' p. 49.

the coast of North America are never able to advance more than 30 miles to seaward.* The ice is aground in 7 fathoms water, and the floes, even at the outer edge, which is of course lighter than the rest, are 35 to 40 feet thick. The nature of the ice is the same along the west coast of Baring Island. When the *Investigator* made her perilous voyage along this coast, the channel between the ice and the cliffs was so narrow that her quarter-boats had to be topped up to prevent their touching the lofty ice on one side and the cliffs on the other. The pack drew 40 to 50 feet of water; it rose in rolling hills upon the surface, some of which were 100 feet high from base to summit, and when it was forced against the cliffs it rose at once to a level with the *Investigator*'s fore yard-arm.† M'Clintock also mentions the very heavy polar ice which is pressed up on the north-western shore of Prince Patrick's Island.‡

Such awful ice as this was never seen before in the Arctic regions. The only way of accounting for its formation, which must have taken a long course of years, is that it has no sufficient outlet, and that it goes on accumulating from year to year. It must therefore be in a virtually land-locked sea, and this of course implies land to the north, as well as to the east, south, and west.§ Here, then, is my bridge by which the Omoki, Tunguses, and Oukilon passed over from the frozen tundra of Siberia to the no less inhospitable shores of Prince Patrick's Island, and to those at the head of Wellington Channel and Baffin's Bay. The theory of Esquimaux migration is thus illustrated by facts in physical geography.

On Melville and Banks islands, and near Northumberland sound, we meet with the same ruined *yourts* of stone and earth, the same stone fox-traps, and the same bones of whales and other animals as were seen by Wrangell at the mouth of the Indigirka. These traces were met with by the Arctic expeditions all along the shores of the Parry group, from Prince Patrick's Island to Lancaster Sound, a distance of 540 miles. They were of great antiquity, and had evidently not been occupied for centuries. M'Clintock found the ruts made by Parry's cart, and was led by their appearance, after more than forty years, to assign a very high antiquity to the Esquimaux remains. He says: "No lichens have grown upon the upturned stones, and even their deep beds in the soil where they had rested ere Parry's men removed them are

* Osborn's 'North-West Passage,' p. 70. † Ibid., p. 204.

‡ 'Blue Book,' p. 569. (Further papers, 1855.)

§ Dr. Simpson tells us that the natives of Pt. Barrow have a tradition that there is land far away to the northward, and that some of their people once reached it. It was a hilly country, inhabited by men like themselves, and called *Iglu-mu-ta*. ('Blue Book,' p. 917.)

generally distinct. The astonishing freshness of these traces compel us to assign a very considerable antiquity to the Esquimaux remains which we find scattered along the shores of the Parry group, since they are always moss-covered, and often indistinct."* I myself carefully examined several of these traces of the wanderers, and was equally impressed with their great age. I have here collected a list of the principal remains that have been observed along this weary line of march :—†

1. The remains of huts were found by M'Clure on the north-west coast of BARING ISLAND.

2. On MELVILLE ISLAND Parry found the ruins of six huts, 6 feet in diameter, by 2 feet high, on the south shore of Liddon's gulf. Similar remains were found on Dealy Island, and at the entrance of Bridport inlet.‡ Near point Roche, a piece of drift timber was seen by Vesey Hamilton, standing upright on the summit of a low, flat-topped hill, about 300 yards from the sea, and 60 feet above its level, but no signs of an Esquimaux encampment were found near it. The ground was covered with snow. The drift timber was 6 inches in diameter, and was sticking up about 4 feet out of the ground, being conspicuously placed, as if for a mark.§

3. BYAM MARTIN ISLAND.—Near Cape Gillman there were bones of an ox, and jaws of a bear, and on the east shore General Sabine saw six ruined huts and an antler.‖

4. BATHURST ISLAND.—To the eastward of Allison inlet there were seven huts, some circles of moss-covered stones, and, a few miles to the west, another hut. On the west side of Bedford Bay there were six huts, and some circles of stones, of great age. On Cape Capel M'Clintock examined ten winter habitations, and the bones of bears and seals, some of them cut with a sharp instrument. From various circumstances he was led to believe that none of these huts have been inhabited within the last 200 years. The general form of the huts is oval, with an extended opening at one end. They are 7 feet long by 10, and are roofed over with stones and earth, supported by bones of whales.¶

5. CORNWALLIS ISLAND.—At the western entrance of M'Dougall Bay there are some very ancient Esquimaux encampments.** On an islet in Becher Bay I found three moss-covered circles of stones, the sites of summer tents, and a portion of the runner of a sledge. West of Cape Martyr there are numerous sites of summer tents, with heaps of bones of birds, and some very perfect stone fox-traps. On the eastern side of Cape Martyr Osborn carefully

* 'Blue Book,' p. 582. (Further papers, 1855.)
† Markham's 'Franklin's Footsteps,' p. 115.
‡ Parry's first voyage.
§ 'Blue Book,' p. 625. (Further papers, 1855.)
‖ Parry's first voyage.
¶ 'Blue Book,' p. 183. (Additional papers, 1852.)
** Ibid., p. 278.

examined a winter hut. Its circumference was 20 fee , and the height of the remaining wall 5 feet 6 inches.* The walls were overgrown with moss, and much skill was displayed in the arrangement of the slabs of slaty limestone. Farther to the eastward I found traces of an extensive winter settlement, a neat grave of limestone, and many heaps of bones. The whole coast is strewn with remains from Cape Martyr to Cape Hotham, and there are several on Cape Hotham itself.

6. WELLINGTON CHANNEL.—Extensive Esquimaux remains, of comparatively modern date, as compared with those at Melville Island, were found on the extreme eastern shore, beyond Northumberland Sound; and an Esquimaux camp was lying on the beach near Cape Lady Franklin. On the Western shore of Wellington Channel, ten miles north of Barlow Inlet, the remains of three huts were found.

7. GRIFFITH ISLAND.—I found the sites of four summer tents on the western beach, with bones of birds in and around them, also part of the runner of a sledge, a willow switch 2 feet 3 inches long, and a piece of the bone of a whale, a foot long, marked with cuts from some sharp instrument. Farther on, there were ruins of two huts, and some fox-traps †

8. PRINCE OF WALES ISLAND.—On the shores of the channel, between Russell and Prince of Wales Islands, there are ruins of huts, with many bones, and on the shore of a deep inlet farther west there was an old Esquimaux *cache*, containing bones of seals and bears.‡

9. NORTH SOMERSET.—Ruined huts were found at Leopold Sound, and still farther south by Allen Young, who also saw semicircular walls of very ancient date, used for watching reindeer. There are now no inhabitants on North Somerset.

10. NORTH DEVON.—Remains of Esquimaux huts were found on Cape Spenser, Cape Riley, and in Radstock Bay. On a peninsula at the entrance of Dundas Harbour, I found several huts with moss-covered walls three feet high, a small recess on one side, and a space for the entrance on the other. I also examined twelve tombs built of limestone slabs, containing skeletons.§ I am aware that Esquimaux belonging to the Pond's Bay tribe were afterwards met with at this place by Captain Inglefield. They had come upon the depôt which was landed at Navy Board Inlet, on the opposite coast, by Mr. Saunders, and had thence crossed over to Dundas Harbour, and finding good hunting and fishing there, they

* Osborn's 'Stray Leaves,' p. 143.

† 'Blue Book,' p. 266. (Additional papers, 1852.)

‡ Allen Young found remains of stones for keeping down summer huts all round the southern side of Prince of Wales Island.

§ Markham's 'Franklin's Footsteps,' p. 61.

had continued to visit it in the summer. But I still think that the stone huts and tombs are the remains of a more ancient race. The Pond's Bay Esquimaux, like those of Boothia and Igloolik, farther south, pass the winter in snow huts, and not in *yourts* of stone and earth.*

We have thus been enabled to trace the route taken by these ancient wanderers in search of the means of sustaining life, step by step, along the whole length of the Parry group, from Baring Island to Cape Warrender. This region does not afford the necessary conditions for a permanent abode of human beings. Constant open water during the winter,—at all events in pools and lanes, appears to be an absolute essential for the continued existence of man in any part of the Arctic regions, when without bows and arrows, or other means of catching large game on land. This essential is not to be found in the frozen sea, whose icy waves are piled up in mighty heaps on the shores of the Parry Islands. Reindeer, musk oxen, and hares are in abundance on Melville and Baring Islands throughout the winter, but the emigrants, whose course we are endeavouring to trace, were no more able to catch them than are the modern "Arctic Highlanders." There animal food, too, without blubber of seal or walrus for fuel with which to melt water for drinking purposes, would be insufficient to maintain human life in the Arctic zone. As they advanced farther east they would come to the barren limestone shores of Bathurst and Cornwallis Islands, where the club moss ceases to grow, where all vegetation is still more scarce, and where animal life is not so abundant. A few years of desperate struggling for existence must have shown them that their journey half round the world was not yet ended. Again they had to wander in search of some less inhospitable shore, leaving behind them the ruined huts and fox-traps which have marked their route, and helped to identify them with the fugitives who left their *yourts* at the mouths of the Indigirka and the Kolyma. We have every reason to believe that no Esquimaux have since visited the Parry Islands.

The emigrants probably kept marching steadily to the eastward along and north of Barrow's Straits. They doubtless arrived in small parties throughout the fourteenth, fifteenth, and sixteenth centuries. They seem to have been without canoes, but to have been provided with dogs and sledges; and on reaching the mouth of Lancaster Sound they appear to have kept along the shore, leaving traces in the shape of ruined huts at the entrance of Jones's Sound, and finally to have arrived in Greenland, on some part of the eastern shore of Smith Sound, not improbably at the "wind-loved" point of Anoatok. Thence, as new relays of emi-

* Parry's second voyage. Ross's second voyage.

grants arrived, they may be supposed to have separated in parties to the north and south, the former wandering whither we know not, the latter crossing Melville Bay, appearing suddenly among the Norman settlements, and eventually peopling the islets and fiords of South Greenland. Some of the wanderers remained at the "wind-loved" point, established their hunting grounds between the Humboldt and Melville Bay glaciers, and became the ancestors of that very curious and interesting race of men, the "Arctic Highlanders."

Unlike the Parry Islands, the coast of Greenland was found to be suited for the home of the hardy Asiatic wanderers, and here at length they found a resting-place. Its granite cliffs are more covered with vegetation than are the bare limestone ridges to the westward. The currents and drifting bergs keep pools and lanes of water open throughout the winter, to which walrus, seals, and bears resort. Without bows and arrows, without canoes, and without wood, the "Arctic Highlanders" could still secure abundance of food with their bone spears and darts. For generations they have been completely isolated by the Humboldt glacier to the north, and the glacier near Cape Melville to the south. Thus their range extends along 600 miles of coast line, while inland they are hemmed in by the *Sermik-soak*, or great ice-wall. Dr. Kane tells us that they number about 140 souls,* powerful, well-built fellows, thick-set, and muscular, with round chubby faces,† and the true warm hearts of genuine hunters; ready to close with a bear twice their size, and to enter into a conflict with a fierce walrus of four hours' duration on weak ice. I do not see any valid grounds for Dr. Kane's supposition that they are fast dying out. Their *igloo*, or winter habitation, is a circular stone hut, about 8 feet long by 7 broad, and is identical in all respects with the ruins which we found on the shores of the Parry islands. It should be observed also that by comparing the vocabulary of the language of the Greenland Esquimaux with that of the Tchuktches of northern Siberia, it will be seen that both dialects are of the same mother tongue, It is not, however, my intention to enter upon a discussion of the habits of these singular people, or to describe their dress, their weapons, or their habitations; these points, interesting as they are, would form abundant material for another paper, and would more fitly be considered at a meeting of the Ethnological Society.

I desire on this occasion to confine myself to the *migrations* of the Greenland Esquimaux, and, in conclusion, to point out the interesting field for ethnological research which probably lies before a Polar expedition in regions of which we now know nothing. The discoveries of geologists have recently brought to light the

* 'Kane,' ii. p. 108. † Ibid., p. 250.

existence of a race of people who lived soon after the remote glacial epoch of Europe, and who were unacquainted with the use of metals. Their history is that of the earliest family of man of which we yet have any trace; while here, in the far north, there are tribes still living under exactly similar conditions, in a glacial country, and in a stone age. A close and careful study of this race, therefore, and more especially of any part of it which may be discovered in hitherto unexplored regions, assumes great importance, and becomes a subject of universal interest.

I ventured to hint just now that, after the arrival of the Asiatic emigrants at the "wind-loved" point, while some went south and, driving out the Norsemen, peopled Greenland; and while others remained between the forks of the great glacier, a third party may have wandered north to still more remote and now unknown shores, where the required conditions for their existence may be attainable. I believe this to be far from improbable. It is true that the "Arctic Highlanders" told Dr. Kane that they knew of no inhabitant beyond the Humboldt glacier, and this is the farthest point which was indicated by Kalahierua—*Erasmus York* (the native lad who was on board the *Assistance* for more than a year), on his wonderfully accurate charts. In like manner the Esquimaux of Upernavik knew nothing of natives north of Melville Bay until the first voyage of Sir John Ross. Yet we know that there either are or have been inhabitants north of Humboldt glacier, for Morton (Dr. Kane's steward) found the runner of a sledge, made of bone, lying on the beach on the northern side of it.* There is a tradition, too, among the Arctic Higlanders that there are herds of musk oxen far to the north on an island in an iceless sea.† Assuredly if Morton gave an accurate account of what he saw beyond the 80° of N. latitude, the Esquimaux who wandered towards the Pole would have no inducement to return south again. Open water means to them life. It means bears, seals, walrus, ducks, and rotches. It means health, comfort, and abundance.

In the belief of some geographers there is a great *Polynia*, or basin of open water round the Pole.‡ Wrangell says that open water is met with north of New Siberia and Kotelnoi, and thence to the same distance off the coast between Cape Chelagskoi and Cape North.§ If this be the case the Omoki and Onkilon, who fled before Tartar or Russian invasion, had no reason to regret their change of residence. A land washed by the waves of a Polynia would be a good exchange for the dreary *tundra* of Arctic Siberia, where the earth is frozen for 70 feet below the surface. Dr. Petermann, and other geographers, believe that open water at all seasons, probably forming a large navigable Arctic ocean, extends along the

* Kane, i. p. 309.
† Hayes, p. 35.
‡ Petermann's 'Search for Franklin.'
§ Wrangell, p. 504.

northern coasts of Siberia, and of the Parry group. Now if these theories be anything like the truth, I think that scattered tribes will also be found far to the north. Wherever a *Polynia*, be it large or small, really exists, there men who sustain life by hunting seals and walrus may be expected to be found upon its shores. We may reasonably conclude then, if the region between Morton's farthest and the Pole bears any resemblance to the coast of Greenland, if there is a continent or a chain of islands with patches of open water near the shores, caused by ocean currents, that tribes will be found resembling the "Arctic Highlanders," who extend their wanderings to the very Pole itself. Such a people will be completely isolated, they will be living entirely on their own resources—far more so even than the "Arctic Highlanders," since the North water has been for the last forty years visited by whalers and explorers; and a full account of the habits, the mode of life, and the language of so isolated a people will be to many of us among the most valuable results of the contemplated Polar expedition.

I have thus endeavoured to point out the route which was probably taken by the ancestors of the Greenlanders, and of the supposed denizens of the Pole, in their long march from the Siberian coast. I am not in the least wedded to the theory which is propounded in this paper, but I have solicited your attention in order to point out, by a few suggestive hints, what a wide field of interesting and valuable research is waiting for investigation in the science of ethnology alone in the region of the Pole; and, be it remembered that this is but one out of many branches of knowledge which will be enriched by future North Polar explorers.

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## VIII.—*On Stereoscopic Maps, taken from Models of Mountainous Countries.* By FRANCIS GALTON, Esq., F.R.S.; illustrated by Specimens photographed by ROBERT CAMERON GALTON, Esq.

*Read*, March 13, 1865.

A LARGE amount of theory and practical skill has been directed to the art of mapping mountainous countries, on an accurate and pictorial system; but the results are far from satisfying the every-day requirements of mountaineers and other travellers. The idea obtained from the best of these maps is considerably inferior to the knowledge gained by seeing a model.

There are serious obstacles to the complete success of the map-maker in representing mountainous countries. Simple shading is too feeble an instrument to express gradations of relief, and the insertion of names interferes with the regularity of the shading. Contour maps are complete failures whenever crags and cliffs

have to be represented, for the lines then become so superimposed as to be wholly unintelligible.

I have often had disagreeable experience of the inadequacy of maps to express the configuration of Alpine districts; and, on thinking how it could be remedied, the idea occurred to me of testing the effect of stereographs. I accordingly borrowed a few of the smaller and less delicate models from the collection of the Royal Geographical Society, and placed them in the hands of my cousin, Mr. R. Cameron Galton, who is an excellent amateur photographer, and who had kindly offered to assist me in carrying my object into effect. The result has been the production of the instructive specimens which we have exhibited to the Society.

It was not our aim to go to greater labour and expense than was necessary to show the complete feasibility of the idea. If larger models had been attacked, it would have been necessary to photograph them *in situ*, by erecting a stage above them, on which a camera could traverse in a vertical position. It would also have been necessary to have recourse to some special means of illumination. All this would have created an amount of labour and inconvenience which would, I believe, be henceforth well justified on the part of professional photographers, making stereoscopic maps for the purpose of sale, but which was in no way requisite to prove what I wished to maintain, namely, the effectiveness of this method of chartography.

It is not by any means necessary that these maps should be limited to the size of ordinary stereoscopic slides. A specimen is exhibited of the Island of St. Paul, taken in four quarters, in which the four pair of stereoscopic prints have been brought pretty closely together, both laterally and longitudinally, with good effect. If we call the upper quarters A 1, and A 2, and the lower quarters B 1, and B 2, and if we distinguish the left and right-hand halves of each stereoscope by the letters *l* and *r*, then the photographs have been pasted side by side, as in the upper part of the following diagram.

| | | | |
|---|---|---|---|
| A 1 *l* | A 1 *r* | A 2 *l* | A 2 *r* |
| B 1 *l* | B 1 *r* | B 2 *l* | B 2 *r* |
| C 1 *l* | C 1 *r* | C 2 *l* | C 2 *r* |
| &c. | | &c. | |



The four middle squares forming an almost continuous photographic map, as shown in the small diagram to the side; of which either the left side, by itself; or the right side, by itself; may be viewed stereoscopically. For convenience of carriage, the right and left wings of the specimen I exhibit, have been made to fold over the middle part.

| | |
|---|---|
| A 1 *r* | A 2 *l* |
| B 1 *r* | B 2 *l* |

Though, theoretically, the eye-glasses of the stereoscope ought to be held exactly above the centres of each stereograph, yet, I find, that no such accuracy is needed in practice. The glasses may even be held over the line that divides one stereograph from that which lies next below it; for instance, over the line that separates the A's from the B's. We might, therefore, prolong the map to any extent downwards, by annexing rows of C's below the B's; and of D's below the C's; and so on.

I also find that the glasses may be held somewhat out of their proper place, to *one side;* including, for example, a portion of A 2 *l*, and excluding a corresponding portion of A 1 *l*. It is now easy to apply the eyes to the stereoscope, in such a way (partly by withdrawing them to a trifling distance from it, and partly by not looking through the centre of the lenses) so as to limit the field of view, sufficiently to prevent the portion of A 2 that is seen by the right eye, being overlapped by anything seen through the lenses, by the left. There need be no conflict of images between A 1 and A 2. This operation is difficult to describe, but is very easy to recognise and also to effect in practice. Of the whole picture then in view, it is of course only a part that is seen by binocular vision, and therefore stereoscopically; nevertheless a stereoscopic *illusion* is insensibly conveyed to the remainder. This is exactly what occurs in ordinary vision. Only the middle belt of our ordinary field of view is seen by both eyes at the same time; as is instantly to be proved, by shutting first one eye and then the other. It will then be found that fully a sixth part of the field, on either side, has been seen by one eye alone; and that only four-sixths of the total view, have fallen within the range of binocular vision. Nevertheless, we are not conscious of any break in the stereoscopic effect. The stereoscopic illusion is carried on insensibly, principally through the medium of the perspective and shading, which remain unchanged. We are also quite unconscious of the presence of the object that limits the completeness of the true stereoscopic effect. This object is the nose, in ordinary vision; and the woodwork of the stereoscope, in the case we were describing. In either instance, the intervening object is thoroughly out of focus with the images on

which our eyes are intent; and therefore its presence is the more easily to be ignored.

Owing to these properties, we are able to deal with models of very considerable dimensions both laterally and longitudinally. When such a model has been stereoscoped in separate squares, and the prints have been carefully united, it becomes possible to view *any* part of the large map with stereoscopic effect.

Two of the models—that of the Orteles Spitze and of the Island of St. Paul—are Austrian. They are accompanied by maps, prepared with signal success by Austrian artists, that may fairly be considered to represent the most advanced stage of map-making at the present day. A comparison of the stereographs, photographed from the same models that the map-maker endeavoured to represent, cannot fail to show the infinite superiority of the stereographs over the engravings. They belong to quite another order of representation. The delicacy of their detail is far superior to the workmanship of any engraver, and the vividness of their relief is absolutely startling.

The insertion of names necessarily obliterates so much of the surface as is occupied by the strokes of the letters, but it is no hindrance to stereoscopic effect. On the contrary, it is advantageous to it, and for the following reason:—When we look at a model tinted in a perfectly uniform manner, or in purely white plaster-of-Paris, so equally illuminated as to be affected by no shadow whatever, it appears to be flat and featureless. The eyes can select no points on which to converge or to focus themselves, and therefore the stereoscopic effect is *nil*. Under circumstances of ordinary illumination there are always some spots, peaks, or ridges, picked out by the lights and shadows, and therefore there is usually some appearance of stereoscopic relief. The total effect is, however, due to the shading, rather than to the true stereoscopic effect, as is evident from the fact that, whether we look at a purely white model with two eyes or with only one, there is little difference. But as soon as names, discolorations, or marks of any kind, however delicate, are made upon its surface, the case is altered. The eyes find numerous definite points to lay hold of, and the features of the model start into saliency. In illustration of this, I may mention it is a common remark, that the height of a small room appears notably diminished, when its ceiling is painted in a pattern. The fact being, that when the ceiling is of a uniform tint, no stereoscopic data exist, to enable us to estimate its distance from our eyes. Consequently the distance is indefinite, and we think nothing about it. But as soon as the ceiling has been painted in patterns, there can be no possibility of error, nor of forgetfulness of the real height of the room.

Contour lines may be drawn on the model, and will appear on the stereograph with good effect.

The size of an ordinary stereoscopic slide is very suitable for District Maps, such as are commonly inserted in guide-books, where they occupy a single octavo page. As the stereoscopic lenses usually magnify an object twofold, the apparent scale of an ordinary stereograph and of the map that fills an octavo page, are nearly identical. The stereograph of the Orteles Spitze well represents the character of such a district map, as may be found in the Swiss guides of Baedecker and Berlepsch.

Travellers who may hereafter use stereoscopic maps, need by no means burden themselves with box stereoscopes for the purpose of viewing them. The cheap and common little instrument, used like a double eye-glass, proves a perfect substitute in a skilful hand. It consists of two stereoscopic lenses, set into a thin strip of wood, and it will go with perfect ease into the waistcoat-pocket, if the handle be shortened or made to fold.

Numerous models of the more frequented mountain districts are already in existence, on a suitable scale for photography. Many of them are large and heavy, much more important than those from which these stereographs have been taken. They are to be found in the collection of the Royal Geographical Society, in the Geological Museum in Jermyn-street, and in the South Kensington Museum, as well as in numerous other museums both in England and on the Continent. There are, in addition, a few models on a yet greater scale, that have been the labour of years to construct, and form sights that travellers delight to visit, such as that of the English lakes at Keswick, those of Switzerland at Berne, Zurich, Lucerne, and Geneva; and of the Pyrenees at Luchon. Unfortunately for the photographer, the majority of models are too highly coloured, and are placed in far too dark rooms for their convenience. But even these difficulties may be overcome when desired. So far as the models are painted in oil, they can be temporarily tinted with water-colour, to be afterwards sponged away, and the camera could be brought to bear upon them in the following manner:—A stage might be built round the models, like that erected by builders above the large works they are employed upon. A framework, holding the camera in a vertical position, looking downwards, would run laterally on a stage that itself moved longitudinally. This is precisely the same principle as that on which the builder's crane is constructed, by which it is enabled to be brought over any point that may be desired. Lines would next be drawn upon the model, dividing it into squares of a suitable size, and the camera would be brought over the centre of each of these squares in succession. The necessary illumination would be easily obtained by the magnesium light. When

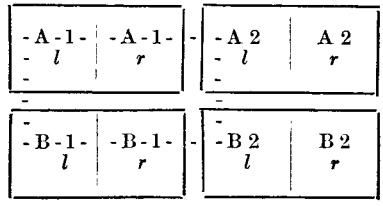
stereographs had been made and printed off, and had to be united, they would be cut with a free hand, following the lines which now, being represented in perspective, would cease to be straight. It is impossible that the adjacent squares, photographed from different points of perspective, should fit against each other with absolute accuracy, but the misfit is inconsiderable.

If the merit of Stereoscopic Maps should be generally recognised, we may expect that models will hereafter be made for the especial purpose of affording photographic copies; and that stereographs of all the frequented mountain districts and passes will become easily obtainable, to the great convenience of the annual ten thousands of summer tourists.

The Photographs exhibited are:—

1. Island of St. Paul, in four parts united together, from a bronze Austrian model.
2. Island of St. Paul, in a single slide, from a bronze Austrian model.
3, 4, 5. Ortcles Spitze, differently marked, for names; from an Austrian model.
6. Mont Blanc district, from Bauerkeller's well-known relief map.
7. Cape Town and Table Mountain, from a coloured model.
8. „ „ from the same, after being whitened.
9. Abyssinia, a rude model.
10. Isle of Wight „

The stereograph annexed to this paper is a part only of one of those that were exhibited at the time it was read; but it is sufficient to illustrate the arguments I have endeavoured to maintain. The stereograph is a part of the sheet of the Island of St. Paul's; which was made by photographing the model in four separate sections, and by subsequently pasting the prints together, side by side. It includes that portion of the original sheet, which is outlined by dots in the annexed diagram:—




It shows not only the excellent effect of stereoscopic maps, but also the ease with which separate stereographs can be united together both laterally and longitudinally; and how they can be viewed through a stereoscope, even on the very lines of their junction, owing to the principles I have explained above.

*Additional Notes.* By ROBERT CAMERON GALTON, Esq.

SOME months back my cousin, Mr. Francis Galton, suggested the possibility of obtaining all the advantages of maps in relief, and other Geographical models, by reproducing them stereoscopically, and proposed to me to carry out this idea. He has obtained for me several models from the Royal Geographical Society, from which I have made the accompanying stereographs. They show all the sharp reliefs of the originals, while they are as portable as could be desired, and I believe this invention is calculated to be of immense value to travellers and others.

Ordinary maps, the very best, give but a very imperfect notion of the physical aspect of a country, while these give every variation of surface with the greatest distinctness. To travellers in mountainous lands it is of the last importance to be acquainted with the nature of the surface, and not less important is such knowledge for strategic purposes. These stereoscopic maps, from their extreme portability and their truthfulness, will, I am sure, open out a new field in the department of maps. I have, of course, met with some difficulties in producing these stereographs. Perhaps the most important has been that of inserting legible names. This difficulty applies chiefly to extremely mountainous countries, where there is but little level ground. In other cases it is scarcely felt. Several methods have been tried to evade the difficulty, and some have been represented in the different specimens. For instance, in the stereograph of the Orteles Spitze, No. 1, I have inserted numbers, and the Orteles Spitze, No. 2, letters of the alphabet, capital, and small, with a printed explanatory index on the back of each stereograph. In the Orteles Spitze, No. 3, I have stretched threads across the model at right angles to each other, like lines of latitude and longitude, with letters and numbers to designate the several squares, after a well-known method, as A 1, A 2, B 1. B 2, &c.; while, instead of an index of names, I have prepared a blank sheet of paper with similar and corresponding squares, letters, and numbers, and have inserted the names of the chief points of interest in their proper places, as shown by the squares; this sheet I have photographed and affixed to the back of the stereograph. In the stereograph of the Isle of Wight I have simply written the names on the surface.

In photographing these portable models, with an ordinary single-lensed camera, working on a stereoscopic slide, I have found it convenient to affix them to a vertical board propped up like an easel, but with a leg in front as well as behind. This position of the model is more manageable than any other, and the light can be arranged as well as, or better than, if the model was horizontal. I have used one of Ross's No. 1 carte de visite lens. In order to

have the marginal definition clear, I have used a small diaphragm, No. 3, with an opening about half-an-inch in diameter, and consequently the time of exposure has been somewhat long, varying from one and a half to three minutes. Some of the models are a good deal discoloured by age and rough treatment: and in order to obtain sufficient contrast in the different parts, I have had either to recolour them with ordinary water-colours, or to coat them over entirely with white. For the latter purpose I have used kaolin, mixed with gum and water, with the best results; it gives a very perfect dead-white surface, and can, moreover, be removed with the greatest ease.

ROBERT CAMERON GALTON.

*Feb.* 14, 1865.

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## IX.—*Water Supply in the Basin of the River Orange, or 'Gariep, South Africa.* By JAMES FOX WILSON, Esq.

*Read*, March 13, 1865.

A VERY noticeable physical fact, which has of late years attracted considerable attention from residents in South Africa, is the gradual drying-up of large tracts of country in the Trans-'Gariep. That great expanse of wilderness, called the Kálahári, remarkable for few inhabitants, little water, and considerable vegetation, seems to be gaining in extent, gradually swallowing up large portions of the habitable country on its confines, and slowly, but surely, assimilating their fertile character to its own sterile one. It has become matter of notoriety that springs, which a few years ago supplied a sufficient quantity of fluid to irrigate considerable breadths of garden and field, have diminished in their flow and dwindled away, causing the migration of the inhabitants to a more favourable dwelling-place; while desert sucking-places and well-filled pools, such as that of Serotli, described by Livingstone, are at present either completely dry, or afford only a small quantity of liquid after much digging, where formerly existed a large piece of water.

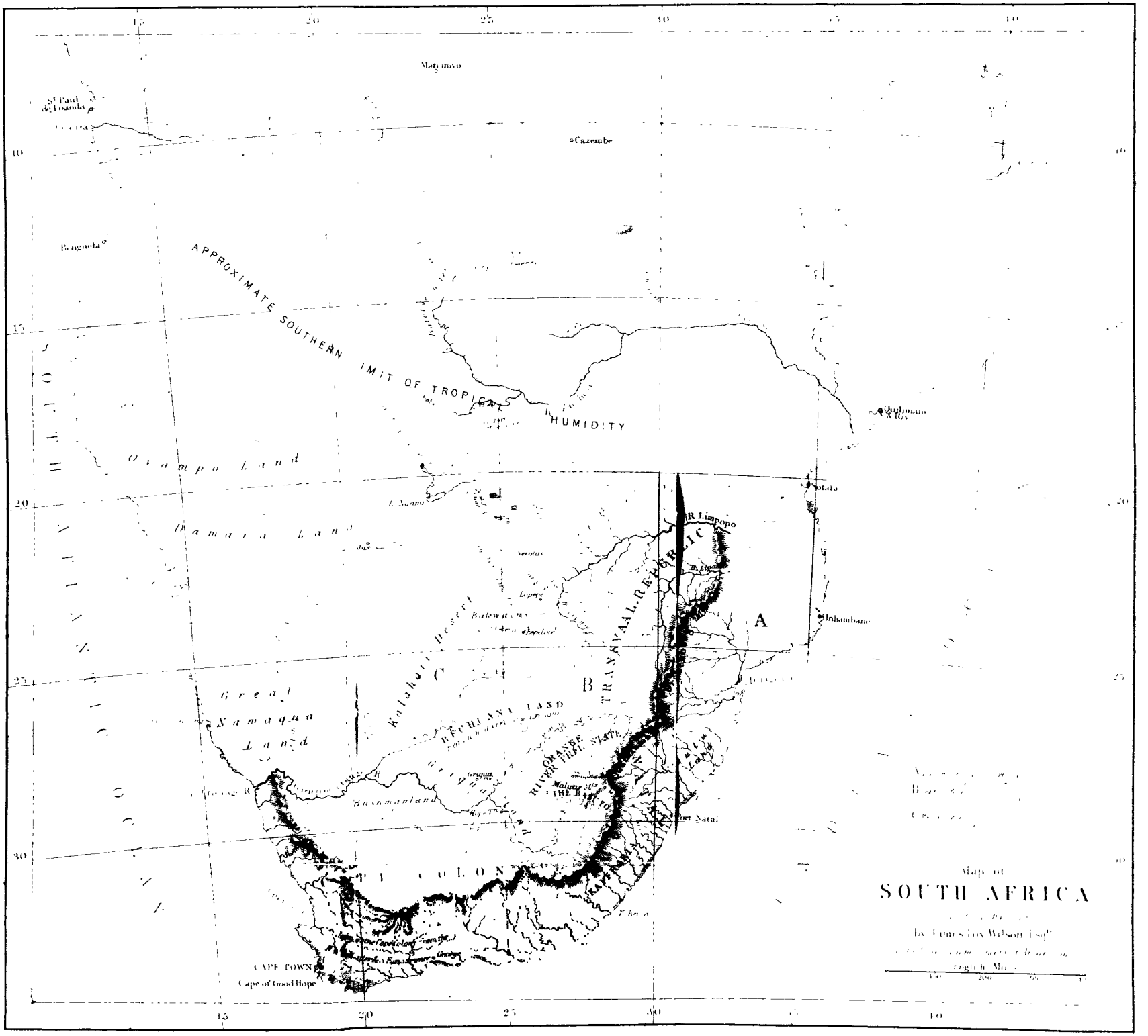
At Lopépe and other places on the road to Lake 'Ngami this is the case, as well as at Tunobis in Damaraland, and elsewhere; but it is most conspicuous in the territory of the Bakwain tribes, in which, as one of the many evidences of the growing desiccation of the country, streams, *e. g.* the Mahalapi River, that at Lopelóle and at Porapora Pass, are pointed out where thousands and thousands of cattle formerly drank, but in which water never now flows, and where a single herd could not find fluid for its support.*

* Livingstone, pp. 14, 150.

the words of the missionary just quoted, "something like an old neglected garden or field."

* Livingstone, p. 110.

† Moffat's 'South Africa,' p. 86.


APPROXIMATE SOUTHERN LIMIT OF TROPICAL HUMIDITY
Ovampo Land
Damara Land
Great Namaqua Land
Kalahari Desert
BECHUANA LAND
TRANSVAAL REPUBLIC
ORANGE RIVER FREE STATE
THE COLONY
A
B
C
R Limpopo
Inhambane
Port Natal
CAPE TOWN
Cape of Good Hope
Map of
SOUTH AFRICA
by Thos Fox Wilson Esqr
English Miles

When Mr. Moffat first attempted a settlement at the Kúrúman forty years ago, he made a dam six or seven miles below the present one, and led out the stream for irrigation, where not a drop of the fountain water ever now flows; and other parts, fourteen miles below the Kúrúman gardens, are pointed out as having contained, within the memory of people now living, hippopotami and pools sufficient to drown both men and cattle.*

The fountain at Griqua Town, which a few years ago yielded a sufficiency of water to irrigate four square miles of corn and garden ground, has of late years and in the most marked manner diminished its supplies, almost ceasing to flow, and occasioning the emigration of many of the Dutch-speaking inhabitants to other and more fertile localities not subject to the absence of moisture.

As this diminution of water has been coincident with the failure of fountains over a wide extent of territory in Bechuanaland, it is evident that from some cause, more or less obscure, *a great change in the external physical characteristics of the entire region between the Orange and the 'Ngami Lake, has taken place since the country was first explored by Europeans.*

This great change has not, however, been confined to the comparatively short space of time during which missionaries have been in the country. On the contrary, the traditions of the natives point to more remote periods, when the country was far more fertile and much better watered than at present—when the Kúrúman and other rivers, with their impassable torrents, were something to boast of. Moffat says that accounts of floods of ancient times, of incessant showers which clothed the very rocks with verdure, and of the existence of giant trees and forests which once covered the brows of the Hamhana Hills, are wont to be related by garrulous elders, to the utter astonishment of their younger listeners. In those ancient days the lowing herds walked up to their necks in grass, and, filling their owners' milk-sacks with rich milk, made every heart to sing for joy.†

But, independent of this oral and traditional testimony, travellers have before their eyes, in the immense number of stumps and roots of enormous trunks of the Acacia giraffe, where now scarcely a single living specimen is to be seen raising its stately head above the shrubs, and in the ancient beds of the dried-up rivers Matlaurin, Mashaua, Molapo, and others, positive demonstration of the departed former fertility of the lands of the Bechuana nation. In fact, the whole country north of the Orange River, and lying east of the Káláhári Desert, presents to the eye of a European, to use the words of the missionary just quoted, "something like an old neglected garden or field."

* Livingstone, p. 110.

† Moffat's 'South Africa,' p. 86.

In investigating the causes which have combined to produce these desolating effects in the Basin of the 'Gariep. it will be necessary for us to dismiss from our minds all theories of cosmical changes; for although at first sight so gradual, extensive, and so marked a diminution of water-supplies might give rise to an idea of the presence of subterranean agency in some form, yet we cannot find that the parts of Africa under consideration are or have been in the past subject to the ravages of earthquakes. If an upheaval, due to agencies operating beneath the surface of the earth, *were* taking place, it must be of extremely slow and almost imperceptible action, and could scarcely be made to account for the present increasing growth of the droughty region. Cosmical convulsions, such as the disruption of hills, the production of faults in strata, and the forcing of river-gorges, may possibly afford us an explanation of the draining out of ancient lakes towards the ocean; but in the case of the gradual diminution of fountains and the final disappearance of rivers no convulsion of nature can be adduced in explanation, neither has any such violent natural operation been observed since Europeans have lived in the country.

Perhaps Dr. Livingstone lays too much stress on his ingenious theory of the forcing of the gorge of the Mosioatunya Falls?* He

* . . . "The path seemed to lead along the high bank of what may have been the ancient bed of the Zambesi before the fissure was made. The Lekone now winds in it in an opposite direction to that in which the ancient river must have flowed. Both the Lekone and Unguesi flow back towards the centre of the country, and in an opposite direction to that of the main stream. It was plain then that we were ascending the further we went eastward. The level of the lower portion of the Lekone is about 200 feet above that of the Zambesi at the Falls, and considerably more than the altitude of Linyanti; consequently, when the river flowed along this ancient bed, instead of through the rent, the whole country between this and the ridge beyond Libebe westwards, Lake 'Ngami and the Zouga southwards, and eastwards beyond Nchokotsa was one large freshwater lake. There is abundant evidence of the existence and extent of this vast lake in the longitudes indicated, and stretching from 17° to 21° s. lat. The whole of this space is paved with a bed of tufa more or less soft, as it is covered with soil or left exposed to atmospheric influences. Wherever ant-eaters make deep holes in the ancient bottom, freshwater shells are thrown out, identical with those now existing in the Lake 'Ngami and the Zambesi. The Barotse Valley was another lake of a similar nature, and one existed beyond Masiko, and a fourth near the Orange River. The whole of these lakes were let out by means of cracks or fissures made in the subtending sides by the upheaval of the country. The fissure made at the Victoria Falls let out the water of this great valley, and left a small patch in what was probably its deepest portion, and is now called Lake 'Ngami. The Falls of Gonye furnish an outlet to the lake of the Barotse Valley; and so of the other great lakes of remote times. . . . All the African lakes hitherto discovered are shallow in consequence of being the mere residua of very much larger ancient bodies of water. There can be no doubt that this continent was in former times very much more copiously supplied with water than at present, but a natural process of drainage has been going on for ages. Deep fissures are made probably by the elevation of the land, proofs of which are seen in modern shells imbedded in marly tufa all round the coast-line. Whether this process of desiccation is as rapid throughout the continent, as, in a letter to the late Dean Buckland in 1843, I showed to have been the case

imagines that in the remote past, the Barotse Valley, the Linótkanóka, parts of the Káláhári, and the basin of the Zouga River, were occupied by a number of long, shallow, slug-shaped lakes, analogous in character to the existing members of the great Central African lake system recently explored by travellers. At that distant period, according to this hypothesis of the Doctor's, the present Káláhári wilderness, with its dreary expanses of wait-a-bit thorn and desert-melon, was comparatively fertile and well watered. The dried-up watercourses which furrow its sandy surface then conveyed to the lakes, the Orange River, the Limpopo, or the Zambesi, treasures of liquid to which it has been for thousands of years a stranger. Accumulations of lacustrine tufa, with fluviatile shells embedded, testify to the substantial correctness of this ingenious theory; and it is further supported by the occurrence of gorges, through which the superabundant accumulations of lacustrine water have, without doubt, forced their way to the ocean. But this process of draining out, to which Inner South Africa has evidently been subjected, must have taken place at a time so remote, that in all probability it occurred in the Quaternary geological epoch, as it is sometimes called, when gigantic quadrupeds are, by some geologists, supposed to have been the contemporaries of man upon the earth; and transpiring, as we presume it did, at so distant an epoch, the drainage of extensive ancient lakes to the ocean becomes entirely useless for all purposes as a theory explanatory of what has been taking place within the last few generations.

Putting aside, therefore, all idea of natural convulsions, we must seek reasons for the continued spread of drought in the physical characteristics of the 'Gariepine Basin itself, and in the customs of its inhabitants. And here doubtless we shall find the true solution of the difficulty.

I. In the first place, *the countries drained by the Great River are naturally arid*, both from their interior position and from the interposition of the Quathlamba Mountains between them and the Indian Ocean, whence the chief supplies of rain are evaporated. It will be necessary, therefore, to speak here of the three meteorological zones into which South Africa may be divided, and at the same time give a description of the different sections into which the 'Gariepine territories are apportioned by recent writers. The meteorological divisions may be regarded as three zones of climate

in the Bechuana country, it is not for me to say; but though there is a slight tradition of the waters having burst through the low hills south of the Barotse, there is none of a sudden upheaval accompanied by an earthquake. The formation of the crack of Mosioatunya is perhaps too ancient for that."—Livingstone's 'Missionary Travels in South Africa,' pp. 527, 528.

(*Livingstone*): the eastern, comprehending Zulu-land, Natal, Independent and British Kaffraria; the central, comprising a portion of the elevated Central Basin of the continent, and divided from the eastern by the Drakensberg, Malutis, and other ranges; and the western, including the Káláhári Proper, the wastes of Namaqualand, and the wilds of Bushmanland—the latter situated to the south of the Orange River.

The first of these, which may be called the zone of the Kaffirs, is pronounced by travellers to be decidedly fertile. It is covered with evergreen succulent trees, occasional extensive forests, and gigantic timber. The zone is comparatively well watered by numerous streams, and has a considerable annual rainfall.

The second, or zone of the Bechuana, consists for the most part of rolling plains or arid prairies, with but few fountains, fewer permanent rivers, and forests (*if such they may be called*) gradually diminishing to a final destruction, which from present appearances cannot long be delayed. Rain here, as a rule, is far from abundant;* irrigation is absolutely necessary to raise European grain, and droughts are of frequent occurrence.

The third, or zone of the Namaquas and Bushmen, sterile and barren in the extreme, is dependent upon thunder-storms alone for the rain, which rushes down its periodical rivers or supplies the vegetation of its deserts.

The prevailing winds of most of the country thus divided are from the north-east. Heavily laden with vapour from the Indian Ocean, the clouds, under the influence of these easterly currents, are driven over the Zulu territory, Natal and Kaffirland, watering those lands luxuriantly; but when the moisture-bearing nimbi arrive at the peaks of the mountain-ranges, not only have they parted with a large proportion of their water, but they are then on the edge of the more arid central basin, and begin to meet with the influences of the heated and naked plains, under the radiation from the surface of which, and in an increasing degree as the Bechuana tribes are passed and the Káláhári is reached, the clouds rise higher above the earth, the moisture evaporates into thinner vapour, and as a consequence fewer showers fall upon the hot thirsty soil beneath.

The further we journey from the Drakensburg eastwards, the greater becomes this diminution of water.

Leaving the mountains, the Lesuto or Basuto land, as it is frequently called, is, without doubt, the best-watered portion of the central meteorological district, mainly, it is presumed, on account of its being intersected by the Malutis range. Towards this im-

* The Lesuto is the exception.

portant section of country, from November to April, the north-east winds blow from the shores of Mozambique and the delta of the Zambesi immense masses of cloud, which sweep heavily over the earth, darkening the sky, and preceded in their course by dreadful peals of thunder. On reaching the high land, the aërial lake is shut in by the huge table-headed mountains; as a consequence, a rapid condensation takes place, and then a veritable deluge ensues. In a few moments cataracts rush from the mountain heights, the smallest and most thread-like rivulets are transformed into torrents, and the rivers, overflowing their banks, cover the plains: this sometimes lasts for days together (*Casalis*). It is from the accumulation of these waters that the Lekoa, the Caledon, and many other tributaries of the great Orange River, which with slow and majestic course flow to the westward across the vast plains of the centre of South Africa, take their rise. As the mountains, however, merge into the plains, and these again into the Kálahari, we are reminded by the gradually diminishing rivers of the continually increasing aridity of the soil, till we reach Great Namaqualand, where the occurrence of periodically filled water-courses again testifies to the descent of rain.

In this latter district, however, as well as in the desert, rain falls only from thunder-clouds. These rise from the north-east, and are always hailed with delight by the inhabitants of those parched and burning regions; but they are partial in the distribution of their precious treasure, the storms frequently passing over with tremendous violence, striking both European and native with awe at their terrific grandeur, while not a particle of rain descends to cool and fructify the barren waste. There is something terribly sublime in a real Namaqualand or Kálahári thunder-storm. The air becomes sultry and oppressive to an unusual degree; the whole animated creation is silent as death; not a breath of wind is perceptible. Low down on the horizon a dense black cloud emits a faint rumbling, which momentarily becomes louder and louder, while the threatening mass, ever increasing, gradually rises, lighted up with the quick flashes of forked lightning. At length a cloud of dust approaches, a storm of wind rushes over the plain, overturning trees, uprooting bushes, and sweeping everything before it in its tumultuous course; a few large spattering drops are heard, and then, with the almost simultaneous blinding glare of lightning and deafening crash of thunder, torrents of mingled hail and rain descend. In a few minutes the country is flooded; currents of turbid water, half a mile wide, roar through a ravine which has not shown a drop of water for years previously, rivulets flow where one would think water had never run before, and the ear is charmed with the sweet strains of a long-silent music. Perhaps in less than an hour the cloud has passed over, and may be seen speeding

onwards to pour out its treasures over many a sunburnt plain and parched mountain.*

Barren, burnt up, and roasted by the sun as are the desolate territories in the western meteorological zone, there are few spots nevertheless, even in the Káláhári Proper, which are covered with shifting sands, or are wholly desitute of vegetation. Even large trees are occasionally to be met with; and some of the periodical rivers of Namaqualand and the Cis-'Gariepine plateaux, in which water seldom flows, may be traced in their winding courses by the mimosa and camel-thorn trees that thinly line their banks. The parched and arid plains of a large portion of the northern division of the British colony support sheep on the thin sprinkling of grass and ice-plants which covers them; and undoubtedly the alpaca and the camel might here be introduced with advantage both to commerce and the highest interests of the native tribes. In fact, however barren and quasi-desert the different sections of the 'Gariepine Basin may be, there are none which do not support countless hosts of wild animals fitted by Providence for dwelling in droughty

* Rev. Henry Tindall's 'Lectures on Namaqualand.' Cape Town, 1856. Mr. Moffat's description of the winds and torms sof Central South Africa is so striking that we cannot help giving it entire from p. 88 of his work:—

"Towards the end of the windy season the cattle snuff the green grass from the tropical regions. Their instinctive powers catch the scent of the green herbage. When this is the case, there is reason to hope that clouds will soon make their appearance from the opposite quarter. These winds I have learned from inquiry come from within the tropics, where rain has fallen and the cool air thereby produced rushes southward over the plains, filling up the space caused by the rarefaction of the air, owing to the approach of the sun to the tropic of Capricorn. The more boisterous these winds are, the more reason we have to expect rain. They cannot extend to any great height, as the thunder-clouds which follow, and which often commence with a small cloud in the opposite direction, increasing into mountains of snow, with a tinge of yellow, pursue an opposite course. These are preceded by a dead stillness, which continues till the tornado bursts upon us with awful violence, and the clouds have discharged their watery treasures. In such a case, there are almost always two strata of clouds frequently moving in opposite directions. The higher mountain-like masses, with their edges exactly defined, going one way, while the feelers, or loose, misty vapours beneath, convulsed and rolling in fearful velocity, are going another; while the peals of thunder are such as to make the very earth tremble. The lightning is of three descriptions, one kind passing from cloud to cloud. This is seldom accompanied with any rain. Another kind is the forked, which may be seen passing through a cloud and striking the earth; this is considered the most dangerous. The most common, not always accompanied by rain, is what we are in the habit of calling stream or chain-lightning. This appears to rise from the earth in figures of various shapes, crooked, zigzag and oblique, and sometimes like a waterspout at sea; it continues several seconds, while the observer can distinctly see it dissolve in pieces like a broken chain. The perpetual roar of awful thunder on these occasions may be conceived when twenty or more of these flashes may be counted in one minute. The lightning may also be seen passing upwards through the dense mass of vapour, and branching out like the limbs of a naked tree in the blue sky above. In such storms, the rain frequently falls in torrents, and runs off very rapidly, not moistening the earth, except in sandy plains, more than six inches deep. These storms are frequently very destructive."

countries; and the presence, wherever water can be found, of the wandering Bushman and Molala (poor Mochuana), the lean Mokálahári, the stupid Koranna, and avaricious Namaqua, who make up the sum of the desert's human inhabitants, testifies that the great market of the world must derive *some* commodities even from its least inviting districts. Water, however, in the shape of a fountain (sometimes hot in Namaqualand), a sucking-place or subterraneous expanse of wet sand, generally in the bed of a periodical or dried-up river, or a shallow desert pool (*vley*), is an absolute necessity to the small communities which war, poverty, or choice, has led to the wilderness.

In those countries, generally remote from the sea, where the average rainfall is but a few inches in the course of a year, the diminution of an inch or two is felt with very much greater intensity than in those favoured lands where the rainfall is more abundant. In arid countries similar to the lands now under consideration, the revolution of the weather in cycles of years is also much more marked than elsewhere. It follows, therefore, that meteorologists find in such countries a sphere for their observations of the greatest interest and importance as connected with the phenomena of drought. In Britain, happily, a dry season conveys only an inadequate idea of drought; but in South Africa extreme droughts sometimes continue for whole years together, reducing the natives to the direst misery, depriving them of their scanty harvests, destroying their herds, and driving them from their homes to wander in search of subsistence.

During the year 1862, an unexampled and very widely-extended drought prevailed throughout the Cape Colony, and made itself felt far into the tropical regions in the neighbourhood even of the Great Lakes. It was very severely felt in the Lesuto, which is a territory generally blessed with abundant rains at stated periods. In this portion of the country, by the month of November, no traces of vegetation remained, the vast grass plains becoming mere sandy deserts from the excessive heat that prevailed. The clouds which overcast the heavens, apparently laden with fertilising treasure, if they would but part with it, seemed to mock at the hopes of the inhabitants. They passed away with the wind which bore on its wings thousands of tons of dry dust, gathered on its sweep over the parched ground for miles and miles; and which went on gathering and still gathering over mountains and plains, until it reached the South Atlantic and Indian Oceans, blasting and destroying vegetation on its way. The largest streams, too, ceased to flow. The cattle died by thousands, and famine began to appear throughout the land. Scarcely any crops could be got into the ground. The sun scorched the earth with its fire, and the rain-makers, whose assumed power over the elements had been

nearly overthrown by the advance of Christianity and civilisation into these regions, again attempted to re-establish their waning authority. The mighty Orange River could be stepped across by a child, and in its upper part at last ran dry, exposing in its bed, near Hope Town, the remains of a waggon which had been lost in a sudden flood while crossing the river some thirty years before. At last, when articles of food had risen to extremely high figures, breadstuffs being higher in price than during the Kaffir war, and cabbages selling at the rate of a penny the leaf at Colesberg, the heavens, whose inexorable serenity had lasted more than a year, were covered with clouds and drops of rain were heard to fall upon the parched ground, soon to be saturated with delightful showers. Although late in the season, the people were enabled to sow a little corn, and by degrees the visitation passed away, leaving behind it the remembrance of a dark dismal dispensation during the continuance of which men's hearts failed them for fear, thousands losing more than half their substance, and multitudes looking forward to absolute ruin and starvation.

The naïve description which Dr. Livingstone gives of the terrible drought that interrupted his initiatory labours as a Christian missionary when he established himself on the Kolobeng River, in the Bakwain territory, will be in the memory of most readers. How, for the space of two years, not more than 10 inches of water fell from the sky, till at last the river itself, a tributary of the fever-breeding Limpopo, ran quite dry. How the fishy inhabitants of the stream, deserted by the limpid waters, were killed in such immense quantities that hyenas from the whole country collected to the feast, and were unable to finish the putrefying carcases. Three years of unpropitious seasons had passed away, and during a fourth the fall of rain was still insufficient to bring the grain to maturity. Nothing could be more trying to the patience and endurance of the poor missionary. Deeper and deeper still the holes were made into the moist sand-patches in the bed of the river, in the hope of getting a little water to keep the fruit-trees alive for better times, but in vain. Needles lying out of doors for months did not rust, and a mixture of sulphuric acid and water used in a galvanic battery parted with all its water to the air, instead of imbibing more from it, as it would have done in a moister climate. Upon vegetation the effect was peculiar, for while the leaves of indigenous trees were drooping, soft, and shrivelled, they were not dead; and the leaves of the mimosæ were closed for repose, not only at night, as is usually the case, but at midday also, as if they required a double season of rest during the absence of rain. Notwithstanding many lowering clouds, the rain would not fall, and it was distressing to the mind of the good doctor to witness the earnestness with which deputa-

tions of heathen counsellors would entreat him to allow the Christian chief Sechelé, formerly a noted rain-doctor to make a few showers only for this once: again and again the clouds collected promisingly overhead, and rolling thunder seemed to portend refreshing showers; but next morning the sun would rise in a clear cloudless sky, without a drop of moisture.*

In such a country, afflicted at intervals with droughts of so devastating a character, the value of water can scarcely be too highly estimated by the inhabitants, nor ought any difficulty which can by possibility be surmounted, prevent the setting on foot of a feasible plan to alleviate the aridity that characterises the sterile parts of the Orange River Basin.

According to the latest geological observations on the neighbourhood of the Kúrúman, there is no perennial fountain in that part which does not come from beneath the quartzose trap that constitutes the filling up of the ancient valley, the igneous rock resting on silurian schists, from the surface of which the water appears to rise. We may remark by the way that this association of rocks is favourable, if we may rely on the dicta of experienced observers (*teste* Sir Roderick I. Murchison), to the probability of the existence of gold. But confining ourselves strictly to our subject, let us notice a few facts in connexion with the most accurately described fountain in South Africa, that called Gasigonyane, which gives rise to the river Kúrúman.

This remarkable spring issues from caverns in a little hill which is composed of blue and grey limestone mixed with considerable quantities of flint, but not in nodules, as found in beds of chalk. From the appearance of the caves and the irregularity of the strata, one might be led to suppose they have been the results of internal convulsions. The water, which is pure and wholesome, is rather calcareous. It is evident that its source must be at a very great distance, as all the rains which fall on the hills and plains for 40 miles round, in one year, could not possibly supply such a stream for one month. Although there are no sandstone formations nearer than 30 miles, great quantities of exceedingly fine sand come from it, and silicious particles appear to boil up out of the smaller springs in front of the larger, and are found in deposit in the bed of the river for miles distant—a proof this of the subterraneous passage of the water from the sides of the elevated basin to the centre, and a strong argument in favour of the probability of the success of artesian wells, if attempted. Large, however, as is the body of water rising from the Kúrúman fountain at its origin, like so many others in South Africa, it is largest at its source; and after running a course of 10 miles,

* Livingstone, p. 20.

becomes evaporated in its bed to the north-west of the settlement.

From the thick deposits of tufa visible on the stems of plants, and elsewhere near fountains, the supply of water must in former times have been much greater than at present; and next to the occurrence of ancient river-beds and watercourses in the desert, perhaps the most conclusive proof of the former well-watered condition of Bechuana-land is to be found in the numerous eyes of fountains partially filled up with sand, rushes, and tufa, which are to be met with in the neighbourhood of the Kúrúman River and elsewhere. Many of these old fountains, by means of long and deep canals made by the Dutch boers from lower levels up to spots that indicate the former presence of water, have been resuscitated and now form permanent streams of great value for irrigation purposes. From the occurrence also of voluminous fountains like the Kúrúman at an immense distance from the sources of water-supply, as well as from the fact of the rising of water from the surface of the silurian schists, which constitute the bottom rocks of the South African central valley, it is pretty certain that the supplies of fluid under consideration flow beneath the plains, from the well-watered table-headed mountains of the eastern ranges, in the same way that the waters of the Algerian Sáhárá flow beneath the surface of the soil from the mountains of the Atlas chain, and reappear in the noted Bahr-taht-el-erd or underground sea of the plain of Tuggurt. There are no fountains in that part of Algeria, but the inhabitants dig through several layers of sand and gravel till they reach a flaky stone-like slate, known always to be above the Bahr. This layer is easily broken through, and the water thereupon rushes up so quickly that the man who digs through it is sometimes drowned.*

Made aware of these facts, the French Government some years ago conceived the idea of forming a chain of stations across the Sáhárá, or a portion of it, from the Tell to Senegambia, each station to be provided with an artesian well.†

In 1856 French engineers dug a well of this character at Zamerna in the Oned-Rís. After 40 days' labour, at the depth of 60 metres, a supply of water yielding 4500 litres per minute was struck, which so surprised the Mogrebbin Arabs that they organised a grand festival in honour of the fountain. In the oasis of Sidi-Rached, the formerly extensive verdure was perishing, and with it, the supply from the spring, when the French sappers constructed a deep well yielding 4300 litres per minute. At the sight of this abundance of water, the tribe was beside itself for

* Morell's 'Algeria,' pp. 229 and 248.

† 'Revue de Paris,' Apr. 24, 1845; 'Chambers's Journal,' vol. iv. p. 92; Davies's 'Algiers in 1857'; 'Année Scientifique,' 1863; 'Almanach des bons Conseils,' 1864.

joy, and the old sheikh, falling on his knees, is said to have thanked God for sending the French to be the means of restoring the oasis to the possession of the tribe. During the last five years, fifty wells have been pierced in the Algerian Sáhárá, yielding 36,766 litres of the fertilising element per minute; an amount of water equal to the flow of several rivers. Notwithstanding this pleasing success, which has been followed by the settlement in villages of several hitherto nomadic tribes, and the planting of palm-groves, it is matter of grave doubt whether the whole chain can be successfully formed to the Senegal.

Sublime vissionaries have not hesitated to assure us of the possibility of reclaiming even the Sáhárá, while more sober intellects have coolly argued the soundness and practicability of their bold theories; but if the digging of deep wells in the Great Desert should be followed by the growth of date and doum palms, the French have already taken a first and most energetic step towards the accomplishment of its reclamation; and reasoning from analogy, there can be but little doubt that if artesian wells have been found successful in the Algerian Sáhárá, they may also be practicable in the Lesuto, or the Bechuana country. The time may be nigher than we anticipate when the advance of railroads from the ports towards the interior, the increased civilization of the aboriginal tribes, and the gradual development of commerce may occasion the experiment to be tried as to whether deep wells may or may not afford perennial supplies of fluid, from subterraneous reservoirs of water beneath the central plains of South Africa; those supplies being derived from the gravitation of the rains from the mountains towards the centre.

II. But in the second place, if the ancient condition of the 'Gariepine Basin were more fertile than at present—and of this we think there can be no reasonable doubt—*is there any cause, besides the interior position of the country and the natural aridity of the soil, which occasions the advance of drought?* WE ASSERT THAT THERE IS, *and that the effects of that originating cause are controllable, and indeed to a large extent preventable.*

The human inhabitants themselves are a prime cause of the disaster, to account for which we find only partial reasons in the central position and physical characteristics of these regions. THE NATIVES HAVE FOR AGES BEEN ACCUSTOMED TO BURN THE PLAINS AND TO DESTROY THE TIMBER AND ANCIENT FORESTS. The Bechuana, especially the Batlapi and neighbouring tribes, are a nation of forest-levellers, cutting down every species of timber without regard to scenery or economy. The large traps or *hopos*, into which wild animals are driven for slaughter, must consume large quantities of trees in their construction, if we consider their immense size and the width of the avenues leading to them. Fuel,

implements of war, husbandry, &c., make away with a large quantity of wood. Dwelling-houses too are chiefly composed of small timber instead of stone, and their fences of branches and shrubs. Thus, when a site for a town is fixed upon, the first consideration is to be as near a thicket as possible, the whole of which is presently levelled, leaving only a few trees, one in each great man's fold, to afford shelter from the heat. The ground to be occupied for cultivation is the next object of attention, and the large trees being too hard for their native iron axes, they burn them down by keeping up a fire at the root. These supply them with branches for fences, while the sparrows, so destructive to their grain, are deprived of an asylum. The fences, as well as those in the towns, require constant repairs; indeed the former must be renewed every year, and, rather than gather or quarry stones to raise a substantial fence, a man will take a forked stick, a thong, and his axe, and occupy nearly a whole day in bringing from a distance a bundle of the hook-thorn to fill up a gap in his cattle or sheepfold.

By this means, the country for many miles around becomes entirely cleared of timber, while in the more sequestered spots, where they have their outposts, the same work of destruction goes on. Thus of whole forests, where the giraffe and elephant were formerly wont to seek their daily food, nothing is now left but a few stumps of camel-thorn which bear a silent testimony to the wastefulness of the Bechuana. In some parts of the country, the remains of ancient forests of wild olive-trees (Olea similis), and of the camel-thorn (Acacia giraffe), are still to be met with; but when these are levelled in the proximity of a Bechuana village, no young trees spring up to take their place.* When the natives migrate from a district, which may be after only a few years, the minor sorts of acacia soon grow, but the acacia giraffe requires an age to become a tree, and many ages must elapse before it can attain the dimensions of its predecessors.

The natives of many tribes, even the Bakáláhári of the desert have also the custom of annually getting rid of the tall dry grass by fire, which on some occasions destroys shrubs and trees to the very summit of the mountains, and must tend very much to produce an altered meteorological condition of the atmosphere, as well as to occasion that desolate and solitary aspect of the country, which European travellers speak of so deprecatingly. In Namaqualand the field (*veld*) is seldom burnt, the fierce and powerful sun seeming to perform that office for the natives, and destroying, in a dry summer, an immense proportion of the young shrubs and trees which spring up in a wet one; the effect of drought in this

* Livingstone, p. 112.

instance becoming in its turn an auxiliary cause of drought; but there are vast regions in the basin of the Orange, and in the Cape Colony itself, bare of timber and bush, not only from the aridity of the soil, but from the pertinacity with which the natives and even colonists of European descent, adhere to the practice of producing an annual conflagration in winter, in order that the flocks may find an abundance of pasturage as soon as the spring sets in. In these bare regions, trees are hardly ever to be found, except on the banks of rivers or in high mountain-passes, as the fire penetrates into all the kloofs or ravines where the most luxuriant vegetation is found, and destroys it.

It appears certain that the farther we proceed westward from the mountains of Natal and Kaffirland, the less becomes the amount of rain bestowed by the clouds. The more denuded of trees and brushwood, and the more arid the land becomes, the smaller the supply of water from the atmosphere. The greater the extent of heated surface over which the partially exhausted clouds have to pass, the more rarefied the vapour contained in them necessarily becomes, and the higher the position which the clouds themselves assume in the atmosphere under the influence of the radiating caloric; consequently the smaller the chance of the descent of any rain on the thirsty soil beneath. And the more the short-sighted colonists and ignorant natives burn the grass and timber, the wider the area of heated surface is made; the further the droughty region extends, the smaller become the fountain supplies, and the more attenuated the streams, till they finally evaporate and disappear altogether. Thus the evil advances in an increasing ratio, and, unless checked, *must advance*, and will finally end in the depopulation and entire abandonment of many spots once thickly peopled, fertile, and productive.

In the case of the fountains at Griqua Town, referred to at the commencement, as having formerly poured forth an abundant supply of water, the accidental destruction of whole plains of the wild olive-tree by fire near the town, and the removal of the shrubs on the neighbouring heights, are known to have preceded the diminution of rain, and subsequent diminution of the springs, the subterraneous caverns which acted as reservoirs in the bowels of the earth ceasing to be supplied from the clouds. There can be no question that, hitherto, vegetation, like animal life, has, in South Africa, been wastefully and ignorantly destroyed, in direct violation of physical laws, which can never be broken with impunity; and if we compare what is now taking place there with what has transpired in other arid countries, our conviction must deepen that it is not so much to the waywardness of nature as to the wilfulness of man that we must assign the recent extension of the Káláhári Desert.

If we cautiously and carefully examine the subject, we shall find that in many temperate countries, and even in some cold ones, the felling of forests has been attended by a greater or less diminution of moisture, and an alteration of the climatic conditions. This has been the case in the Canadian settlements and the Eastern States of the North American Union, which, since being won from the primeval forest, have markedly improved in general salubrity and meteorological condition.* Moreover, the general climate of Europe has undoubtedly undergone a great change since the destruction of the great belt of forest that, in the days of the old Romans, occupied its central portions. Not only has the climate of the old world become increasingly dry, but it has become warmer, the severe winters and heavy frosts described by ancient classical writers† being now almost unknown in the South of Europe. In these cases the felling of timber, because productive of the removal of dank vegetation and unwholesome moisture, has operated to the improvement of the soil, increasing its producing capabilities, and occasioning it to be better fitted for the residence of man. The general character of ancient Europe, both insular and continental, whilst yet unreclaimed and overspread with forests, would naturally be more humid, and consequently colder. When cultivation and a vast increase of population occasioned the removal of the timber, the freezing of the Danube and Tiber would gradually become matter of history, and heavy frosts in Greece and Italy a cause of wonder.

While the climate of our quarter of the globe has thus, we repeat, been ameliorated by the removal of the superabundance of wood, on the other hand, in the steppes of Southern Russia, in Northern Africa, in some parts of Italy, Greece, European Turkey, and Persia, many a bare tract exists which owes its origin to the folly or neglect of rulers or subjects, who have removed, to the extent of absolute extermination, those natural protectors of humidity—the trees—and have thus turned fruitful gardens into a waste.

In Greece and Asia Minor the traveller finds the reality fall far short of the description of the scenery given by the celebrated writers of olden time. The mighty streams so magniloquently described in the poems of antiquity, are found to be mere rivulets compared with the grandiose accounts of the old epics. The sparkling cascades and fountains which, in enchanting the eye, also prompted the verse of the classic writers, have disappeared under the powerful influences exerted by ages of war, misrule, and

* Daubeny's 'Lectures on Climate,' p. 114.

† Virgil's 'Georgics,' lib. iii. 349-370. Ovid's 'De Ponto,' lib. iv. eleg. 7 and 9. For other authorities, *vide* Daubeny 'On Climate, pp. 104 *et seq.*; *vide* also Milner's 'Crimea,' pp. 16 *et seq.*

oppression. Districts once covered with rich crops of corn, with olive and vineyards, orchards and groves, are at the present time mere expanses of sand or barren rocks, or arid flats.* The same remarks are also true of Syria and Palestine, where the land "flowing with milk and honey" has, under the iron heel of the obstructive and oppressive Turk, become in many parts a wilderness covered with stones and ruins.

Proceeding still farther to the East, perhaps there is no part of the world where evidence accumulates upon us of the evil effects resulting from the unwise destruction of timber, than in the more arid provinces of Persia. Here, under the ignorant government of the Shahs, whole tracts of country, once thickly peopled, well watered, fertile, and extensively wooded, are little better than barren wastes, over which the traveller may pass and find no sweet bubbling fountain at which to quench his thirst, no solitary tree spreading its wide branches to produce a welcome shelter for his wearied limbs, no village or hostelry to which he can repair for hospitality. Instead of these, he will pass the remains of canals, bridges, and ornamental fountains, from which the water has been evaporated for centuries; he will encounter ruined houses, fallen walls of gardens, deserted villas, ancient churches and mosques, all baking in the fiery Persian sun, and testifying to the misrule which has so long prevailed here, as in other wretched countries of Asia. A late writer in 'Chambers's Journal,' on the subject of the failure of springs in the East,† asserts that, as far back as the seventeenth century, a Persian nobleman, conversing with a European traveller (Tavernier), assured him that within a comparatively few years no less than four hundred springs had failed in the small province over which he himself ruled; a proof of the fatal consequences of permitting the destruction of timber for fuel without making provision for a fresh growth: for in the ancient days of Persia's greatness, before a Mahometan fatalism had begun to exert its baneful influence upon the Persians, a very different state of things existed. Then groves were planted on eminences; the streams were fringed with wood; orchards and pleasure-gardens, famous for their exquisitely-scented roses, adorned the slopes of the hills; and by careful irrigation through a thousand small canals, industry and energy were enabled to gather in abundant harvests of the fruits of the earth. With the decadence of the political power of Islamism, however, the prosperity of Persia, such as it was under the caliphs, began to pass away: and ruined cities, aqueducts, palaces, and temples, standing in the midst of useless deserts, now offer their

* St. John's 'Manners and Customs of Ancient Greece,' p. 370; also Daubeny 'On Climate,' p. 107.

† 'Chambers's Journal' for July 4th, 1863.

united testimony to the ignorance and incapacity of Mahometan princes.

In our own British colonies of Barbadoes,* Jamaica,* Penang,† and the Mauritius,‡ the felling of forests has also been attended by a diminution of rain. In the island of Penang, the removal of jungle from the summits of hills by Chinese settlers speedily occasioned the springs to dry up, and, except during the monsoons, no moisture was left in the disforested districts. In the Mauritius it has been found necessary to retain all the lands on the crests of the hills and mountains in the hands of Government to be devoted to forest, the fertility of the lower lands having been found by experience to depend upon clothing the hills with wood.

Many provinces of India—more especially the Punjâb and the Dekkan,§—may also be adduced in support of the assertions that have been made, the vicinity of hills having become deserted in consequence of the failure of springs following the destruction of woods: but where the digging of canals has been accompanied by the planting of trees along their banks, the departed barrenness has been again transformed into fertility.‖

In the steppes of Tartary we have abundant proof that physical changes of great magnitude, and similar in character to those which have been noticed on the Orange, have taken place within the historic period. Notwithstanding the present entire absence of trees, and the occurrence of a drought which regularly prevails for half the year, the beds of numerous rivers that once fertilised the country may be traced with the utmost facility to the sources from whence the waters originally flowed. In the time of Mithridates the Crimean steppe was famous for its fertility, and teemed with inhabitants, of which we have sufficient evidence without referring to history, in the ruins of numerous towns and cities, and in the abundance of tumuli which strew the plains. Prince Woronzow, an enlightened Russian nobleman, assured the traveller Spencer¶

* Moffat's 'South Africa,' on the authority of the 'Philosophical Transactions,' vol. ii. 294.

† 'Journal of the Indian Archipelago.' Logan, Singapore.

‡ Thornton's 'History of India.'

§ The author of the article on the Failure of Springs in the East.—'Chambers's Journal,' 1863.

‖ The island of Ascension having lost its only spring a few years since, in consequence of the reckless destruction of its trees (a process which the Cape de Verde Islands having also undergone, have also been visited with in like manner), a systematic replanting under the auspices of English botanists has resulted in the restoration of the water, which it is hoped may now prove permanent, proper protection being afforded to vegetation. On the authority of Dr. Daubeny, it may also be stated that Lower Egypt, which is usually cited as a country where rain never falls, has lost this character, having experienced of late occasional showers of a heavy description in the neighbourhood of Cairo and Alexandria. This remarkable change has been coincident with an extensive planting of trees in the neighbourhood of those cities, under the orders of the late Pasha.

¶ Travels in European Turkey, &c.

that nearly the whole of western Tartary might be rendered a fertile and productive country by the adoption of judicious means. In his opinion, all that is wanted to change the entire character of the climate is to drain the marshes, dig artesian wells in the plains for the purposes of irrigation, and encourage the growth of timber. As the soil is generally of a dark loamy colour, and as, moreover, wherever the ground has been excavated, the roots of gigantic trees have been discovered, testifying to the former well-wooded condition of these now absolutely treeless plains, there can be little doubt that a paternal government might soon verify the truth of this enlightened nobleman's suppositions by a proper system of colonization.

In Northern Africa, Egypt and Lybia have witnessed the advance of the desert since the decline of the Roman empire; and Algeria, although it has made rapid strides under its French conquerors, is still, in great part, the home of frogs, from the prevalence of marshes, and a nest of locusts from the barrenness of its plains. Algeria can only be rendered as fertile as it ought to be on condition that the French cover a third part of its surface with wood, and convert its rapid unnavigable rivers exclusively to the purposes of irrigation. The blindness of civilised states (who in this particular are little better than the uncivilised barbarians whose destructive practices we have been decrying), in foolishly laying the axe to the root of all trees, has been manifested in North as in South Africa; and until the carob, the olive, the cork-tree, the mastich, the oak, and the myrtle, are cultivated by the side of all waters, the rich harvests which rendered ancient Roman Africa the granary of the Imperial City need not be expected. Timber-trees, with roots which strike deep into the earth, it is worthy of remark, alone thrive here in summer, as they strike down to the humid soil under the parched crust; they should therefore be extensively encouraged for the shelter of water and of crops, since sheltered fields, according to an established fact, yield most corn.*

In this French colony, it must be noted further that the Wady-Kniss, called by Nicholas de Nicolai (1587) the Savo, used to be a large stream, and is now only a thread. It contains, however, many dry springs, the drying up having in all probability resulted from the stripping of the woods.†

Nor is the new world without evidence that the burning of prairies and pampas, and the wanton destruction of timber by Indian tribes and marauding Spaniards, has resulted in a deterioration of climate. Father Domenech, in his account of the Great American Desert, speaking of the celebrated Llano Esta-

* Morell's 'Algeria.'

† Baron Baude's 'Algeria,' vol. i. pp. 78-81.

cado, or Staked Plain, says the prolonged drought, the nature of the soil, and the habit that the Indians have of *annually setting fire to the prairies*, account for its aridity. The country of New Mexico, since the invasion of the Spaniards, has become dry, arid, and deserted. Many of the Indian populations were suddenly deprived of both wood and water. Perpetual droughts followed the clearing of the forests. Both rivers and their sources dried up. A multitude of streams in Texas and New Mexico have ceased to flow—some for centuries, others only within a few years; and their banks, formerly gay with verdure, plants, flowers, and trees, now disappear under heaps of sand, and present everywhere a scene of desolation.

On the banks of the Rio Verde, in the new territory of Arizona, abound ruins of stone dwellings and fortifications, situated in valleys where traces of former cultivation and of small canals for irrigation are yet visible. The traditions of the Indians, as under similar circumstances in Bechuanaland, point to a time when the elevated table-lands around were covered with magnificent and fruitful vegetation. But the timber was destroyed, the prairie-grasses were burnt off, and the Great Desert thereupon asserted its right to consider the newly-devastated lands as portions of its own territory, and evaporated the springs and rivers under the influence of its desiccating atmosphere.*

Turning to South America, Humboldt informs us that the Lake of Valencia, in the state of Venezuela, is calculated, being destitute of an outlet, to gauge with the greatest nicety the increase or diminution of the rivers that pour their waters into it. From a careful examination, that accurate observer was convinced, both from the form of the surrounding hills, and from the occurrence of fresh-water shells in the heart of the country, that a great retrogression of the waters had taken place. No evidence, however, exists that any considerable diminution of them has taken place in very recent times, although within thirty years preceding Humboldt's visit, the gradual desiccation of this great basin had excited general attention. This diminution is not to be accounted for, our traveller declares, by imagining the existence of subterraneous channels, as some suppose, but by the effects of evaporation, increased by the changes operated upon the surface of the country. Forests, he says, by sheltering the soil from the direct action of the sun, diminish the waste of moisture; consequently, when they are imprudently destroyed, the springs become less abundant, or are entirely dried up. Till the middle of the last century, the mountains that surround the valleys of Aragua, where the lake is situated, were covered with woods, and the plains with thickets

* Domenech's 'Deserts of North America,' vol. i. p. 380.

interspersed with large trees. As cultivation increased, the sylvan vegetation suffered; and, as the evaporation in this district is excessively powerful, the little rivers were dried up in the lower portion of their course during a great part of the year. The land that surrounds the lake being quite flat and even, the decrease of a few inches in the level of the water exposes a vast extent of ground; and as it has retired, the planters have taken possession of the new land.*

Five-and-twenty years after the visit of Baron Humboldt to Venezuela, M. Boussingault relates that, the country being desolated by the War of Independence, the lake was fuller than formerly, owing to the partial return of the land to a state of nature on the abandonment of many plantations. Hence, as timber was no longer felled to the same extent, rain fell in greater abundance, and the lake advanced in consequence.† Another lake without an outlet, situated in New Granada, supplied Boussingault with a second and similar instance of the connexion between the quantity of timber and the amount of rain. Here the recession of the waters was a matter of general notoriety, and coincident with the diminution had been the clearing of the surrounding forests, to afford fuel for the salt-works that exist in the neighbourhood. Nor could this have arisen from any change of climate; for in other places in the same neighbourhood, where no clearings have taken place, and where everything has continued to be left to nature, the level of the lakes has undergone no change from time immemorial.

It being matter of notoriety in these instances that the removal piecemeal of forests, and the burning off of jungle from the summits of hills, has occasioned the uplands to become dry, and the lowlands to lose their springs, it becomes of extreme importance to our South African fellow-subjects, that the destruction of the arboreal protectors of water should be regarded as a thing to be deplored, deprecated, and prevented; and that public opinion on the matter should be educated. At no period more than the present, when the effects of the terrible visitation of 1862 have not yet ceased to be felt, could the consideration of every topic connected with the subject of drought and its causes be more appropriate. And the establishment of private mercantile undertakings at Walfisch Bay, the development of the copper-mines in Little Namaqualand, the gradual extension of British emigration to the prairies of the Free State and the North generally, the growth of British influence in the townships and homesteads of those prairies, culminating in the election (1864) of a British subject to the Presidency of the Republic, the desire which is increasingly mani-

* Macgillivray's Translation of Humboldt's Travels, pp. 173 *et seq.*
† Daubeny's 'Lectures on Climate,' p. 105.

fested for the re-establishment of British supremacy there, as well as the advances made in civilisation by the Griqua and other native tribes, all combine to add to the importance of this question, not only to the scientific world, but to the colonial authorities at the Cape.

Up to the present the efforts made to employ irrigation in raising crops have been on the smallest scale, and little or no attention has been paid to the planting of trees for the purpose of protecting water, save at the Kúrúman mission-village, where a considerable number have been planted by the veteran Moffat. Impelled by the best of motives, that of ameliorating the social as well as moral condition of the natives, whose tongue he himself reduced to grammatical rules, this gentleman has by precept and example been endeavouring to prevent that wholesale and wasteful destruction of timber which has prevailed from time immemorial. He declares his conviction that in process of time the natives will come to understand that trees are the true rain-makers, and to believe in the philosophy of encouraging their growth. He does not despair, he says, of eventually seeing the whole of the population—some of whom are now commencing the use of stone fences and brick houses—so fully satisfied on this point, that they will find it for their own interest, as well as contributing to the beauty of the country, to plant trees; more particularly as very few others, besides those indigenous to the soil, will grow to any extent.

But we must not stop here. The evil is one of such magnitude, and likely to bear so abundant a harvest of misery in the future, that the authority of law, wherever practicable, should be invoked in order to institute preventive measures. Not only should fuel be economised, but the real interests of the British colonies and Dutch republics, for many long years to come, would most certainly be consulted by the passage of stringent enactments which should in the first place forbid, at any season or under any circumstances whatever, the firing of grass on field or mountain. The absolute necessity which exists for keeping as large a surface of the ground as possible covered with vegetation, in order to screen it from the solar rays, and thus to generate cold and humidity, that the radiation from the surface may not drive off the moisture of the rain-bearing clouds in their season, ought to compel the rigid enforcement of such a legal provision. Those colonial acts on this subject which are already in existence—for the Colonial Parliament at the Cape has found it necessary to pass restrictive measures—are not sufficiently stringent to be of much service, inasmuch as they are not entirely prohibitory, permitting the burning of the field at certain seasons of the year.

In the second place, provision should be made in connexion

with every work of irrigation to keep up at least a fringe of trees on the banks of canals, rivers, and watercourses. The damming of streams with strong works, as in Australia, for the purpose of preserving water in reservoirs and tanks, would afford a very favourable opportunity for introducing into private bills brought before provincial Houses of Legislature, clauses insisting upon the carrying out of such a provision. Irrigation companies and others would also find it to their advantage to cover with such trees as are indigenous to the country, or any others which could be grown with profit, all hills and elevations unsuitable for pasturage in the neighbourhood of their works. In the old slave-times, the Dutch farmers were accustomed to plant a great many firs, oaks, and poplars; but since the emancipation of the Hottentots, the avenues and groves have been, and still are, foolishly cut down for timber, fuel, &c., and they are seldom replanted. On the other hand, the sandy desert near Cape Town, called the Cape Flats, is now being planted over with trees, shrubs, &c., as an experiment. The result so far is encouraging, and renders it worthy of imitation wherever practicable. What was formerly a vast sheet of drifting sand is now covered with vegetation; and from private information lately received, we learn that some parts are being brought into a high state of cultivation.

The institution of *pépinières* or nursery-grounds, whence young trees could be distributed under the direction of experienced practical men, would also be a great boon. Considerable attention has been paid to the flora of South Africa by gentlemen of note in the world of natural history; but South African arboriculture is still a field for investigation worthy of entry, and would reward research. The trees of Namaqualand and Damaraland are principally acacias, and very few attempts have been made to raise others there. In the neighbourhood of Cape Town oaks, poplars, and firs flourish, and should be multiplied indefinitely. Notwithstanding the excuse of flock-masters, that the pasturage is required in the neighbourhood of water for sheep and horned cattle, and that attention cannot therefore be paid to tree-planting, it becomes obvious that unless as much rocky mountain and hill as is practicable for the growth of timber, added to a considerable breadth of good land, be covered with wood, the present pasturages must deteriorate, and the diminution of water become probable; whereas, if attention be now paid to the growth of Australian trees, hard wagon-woods, Algerian or other timber-trees, the lumber would in the course of years become a source of revenue; while the impediment to the free circulation of air arising from the thick foliage, would combine with other causes in condensing vapour, and thus add to the water-supply, a fact which is sufficiently patent in warm climates to be undeniable.

Along the Orange River and as we approach the tropic, date-palms and doum-palms might be profitably planted near water. The dwarf-palm or palmetto of South Europe, and that of South Carolina, ought also to flourish in the opinion of Dr. William Harvey,* the Dublin Professor of Botany; and even the cocoa-nut, as a shade-plant, but scarcely in the hope of its fruiting. Some of the dwarfer and more leafy Eucalypti of New Holland would also serve a purpose. The various native species of Rhus, of Euclea and of Royena, may be mentioned as plants well adapted for shelter; also the dense-headed acacias, of which several species grow about the Orange River, as well as the willow of the 'Gariep. Other trees affording timber might doubtless be grown for various purposes in the neighbourhood of markets for the wood; but to do this advantageously would necessitate a thorough investigation on the spot of the capabilities of the region. In point of fact, the full consideration of this interesting subject in all its bearings can only be pursued in the colony itself under the sanction of colonial savans, and no money granted by a provincial Parliament would be better spent than a small sum devoted by authority to the investigation of this branch of economic botany.

In concluding this imperfect glance at a very comprehensive subject, we may observe that such is the incurable aridity of many portions of the Orange River Basin and its neighbourhood, that perennial fountains and permanent pools are not, under any circumstances, to be expected. In these districts, Bushmanland, Namaqualand, and Damaraland—not to include the Desert Proper—the want of permanent supplies of water condemns to a more or less nomadic life the pastoral inhabitants who dwell there; they are forced to wander with their flocks and herds in search of pasture. Deep wells in places where limestone rocks crop out, as at Barmen, Wesleyvale, &c., might possibly supply a considerable quantity of water, should it ever be worth while to construct them. A considerable proportion of the rainfall might be also arrested in the ravines or wadys. But in so poor a country, where clay is so rare and sand so abundant, the surface waters drain rapidly off into the arid river-beds, and almost immediately disappear. The habitability of these districts seems to depend upon the formation of pools or lagoons in places where a thin stratum of mud retains with more or less completeness the water above it. Sheltered by trees and vegetation, such pools might hold out until the next rains. Or perhaps the practices in vogue in Australia might be efficacious in South Africa, viz., damming the smaller watercourses

* To this gentleman, who is curator of the University Herbarium at Dublin, as well as to Mr. Francis Galton, the South African traveller, and to Mr. J. A. St. John, author of the 'Manners and Customs of Ancient Greece,' &c., we are indebted for many important hints and observations.

so as to make artificial reservoirs; then encouraging a judicious vegetation to check evaporation; and finally trusting to the stamping of the feet of sheep to harden by puddling the surface of the land in the neighbourhood of the newly-formed pool.*

## X.—*On the Climate of the North Pole, and on Circumpolar Exploration.* By W. E. HICKSON, Esq.

*Read*, April 10, 1865.

A REVIVAL of interest in Arctic discovery has led me to ask attention to some astronomical considerations, relating to the probable climate of the North Pole, and, connected with them, to other data, bearing upon the question of the direction that should be given to any new expedition that may be organised for the Polar Seas.

It has always been popularly supposed that the immediate areas of the Poles must be the coldest regions of the globe, because the farthest points from the equator. Hence the argument that the higher the latitude the greater must be the difficulties and dangers of navigation; a belief encouraged by a work of some reputation, the 'Révolutions de la Mer' of M. Adhémar; who, seeking to account mathematically for the shifting, in times past, of the bed of the ocean, imagined ice to accumulate at the Poles, continuously but unequally, in such immense masses as to disturb the earth's centre of gravity. It was, perhaps, under the influence of this extreme hypothesis that a writer in one of our best weekly periodicals was induced recently to remark, by way of objection to Capt. Osborn's proposal, that "the hardships and perils of Arctic expeditions have only yet been skirted," and that "new horrors await new exploration."

Quite an opposite opinion, however, had begun to prevail among meteorologists on the publication, in 1817, of the Isothermal System of Alexander von Humboldt, which showed that distance from the equator is no rule for cold, as the equator is not a parallel of maximum heat. The line of maximum heat crosses the Greenwich meridian, in Africa, fifteen degrees north of the equator, and rises, to the eastward, five degrees higher; running along the southern edge of the Desert of Sahara.

In 1821 Sir David Brewster pointed out, in a paper on the mean temperature of the globe, the probability of the thermometer being found to range ten degrees higher at the Pole than in some outer parts of the Arctic circle. No new facts have since been

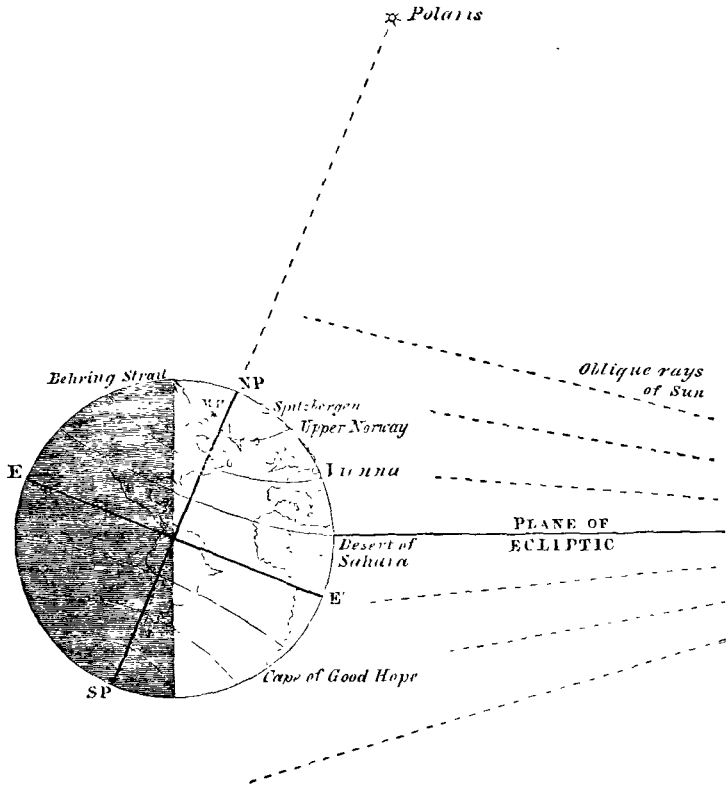
* For this last suggestion I am indebted to Mr. Francis Galton.

discovered to invalidate this conclusion; many, on the contrary, have come to light tending to confirm it;* but much misapprehension still exists on the subject, which can only be dispelled by explaining the Pole's solar position.

The temperature of all places on the earth's *surface* (whatever may be the state of its centre) are primarily governed by their solar aspects; that is to say, by their proximity to or distance from the sun, and the relative directness or obliquity of the solar rays. Now, at *no* time of the year is the Pole either the nearest point to the sun or the farthest from it. Neither in summer nor winter are the solar rays that reach the Pole at noon either so direct or so oblique as at other places; the reason being, that the Pole, instead of being at right angles with the plane of its orbit (called the ecliptic) is inclined to it, from the perpendicular, twenty-three and a half degrees; the parallelism of which inclination is not affected by the earth's rotatory or diurnal motion. These are elementary principles, the application of which should be easy to every one who has studied at school "the use of the globes;" but from their importance to the interests of Arctic navigation I must ask permission to make them clear to general readers by a diagram.

The diagram represents the midsummer position of the earth, with different places upon it, looking towards the sun at noon, on or near the same meridian as Vienna; which is in longitude 1 h. 5 m. 31 s. E., and in latitude 48° 12′ 35″ north; that is, north of the equator; but it will be understood from the diagram, that, *in estimating* solar influence, we have to count our latitude as we reckon that of the stars, from the plane of the ecliptic, and not from the equator. At midsummer noon, Behring Strait is situated 90° from the plane of the ecliptic; the North Pole 66½°; Spitzbergen (on the polar side) 56°; Upper Norway 43°; and Vienna 25° of the same plane. We should expect, then, to find, what in fact we do find, a lower temperature in Behring Strait, about the 21st of June, than in Norway, on the same parallel; and the difference would be greater than it is but for the earth's diurnal motion. Our diagram shows *noon* positions only. At midnight, Behring Strait and Upper Norway change places; E and E′ on the equator doing the same. The climate, or mean temperature of all places on the face of the globe, is governed by this diurnal change of their ecliptic or celestial latitude; involving, outside the Arctic circle, an alternation of forty-seven degrees, and consequently a maximum and minimum of heat every twenty-four hours. The Poles are an exception.

* Dr. Kane, at first shaken upon this theory by the extreme cold of Rensselaer Harbour (nearly at foot of the Great Humboldt glacier, the largest in the world, in lat. 78° 37′ north), found, 200 miles farther *north*, a warmer climate, an iceless ocean, or what appeared such, with "the rocks and shore crowded with sea-swallows; birds whose habits require open water."




Their day and night, their summer and winter, are dependent solely upon the earth's *orbital* motion. Whatever, therefore, the climate of the Poles, their mean temperature from day to day must be more *equable* than that of England, or any other country.*

In winter, the earth having gone round to the opposite side of the sun, the relations of light and darkness, as shown by the open and shaded parts of our diagram, are reversed; but not even in the depth of winter is the North Pole so far from the sun as are many other parts of the globe at midnight.

The fact, however, that the sun is longer absent from the Pole in winter than from other parts of the Arctic circle raises the question of whether the Polar winter, towards spring, may not be colder; but if so, the Polar autumn must be in a corresponding degree

* An important fact; for, although the *mean* of two temperatures—say 50° and 20°—is 35°, it is not the same thing as a *uniform* temperature of 35°. A plant that would live at 35°, would die at 20°; and the human constitution is most tried by sudden changes.

warmer, from the longer presence of the sun at the Pole when its summer has once commenced. At the Pole the sun never sinks below the horizon during six months in the year, and never rises above it during another six months; while in the outer parts of the Arctic circle, when not near the solstices, there is always more or less alternation of day and night within the twenty-four hours.

And this leads me to mark another peculiarity of a Polar climate, important to voyagers, that summer at the Pole begins and ends nearly three months earlier than in the lower latitudes of the same regions; the reason being, that, a few days only after the vernal equinox, the sun at the Pole remains constantly above the horizon, and, soon after the autumnal equinox, is as constantly below it; before, even at Spitzbergen, the days and nights have begun sensibly to lengthen and shorten, and while they, there, yet remain of nearly equal length.

We have also to bear in mind that the night of the Pole, which begins about the 30th of September, and ends about the 30th of March, is rather a prolonged evening than a night, in the sense of absolute darkness. There is always twilight when the sun is not more than eighteen degrees below the horizon; and its depression, at the Pole, is less, four months out of the six; while the sun's extreme depression on the 21st December is but twenty-three. Through a great part, also, of the Polar night there is nearly perpetual moonlight, the moon when at full never setting; and as the Arctic moon is often surrounded with halos of beautiful colours, while the stars are of great brilliancy, and the skies are irradiated besides with the flashing lights of the aurora borealis, the night of the Pole may not only be endurable but even more enjoyable than our short days at the same season, obscured by winter fogs.*

Related to these facts are the phenomena of the earth's magnetic currents.

As far back as 1683 it was announced by Newton's friend and coadjutor, Dr. Halley, that the variations of the needle indicated lines converging upon four magnetic poles; two in the northern, and two in the southern hemisphere. This statement, long neglected, was examined and confirmed at the beginning of the present century, by Professor Hansteen, of Christiana, and is now generally held to have been verified, and in part demonstrated, by the discovery, in 1831, by Sir John and Sir James Ross, of the exact site of one magnetic pole (marked in our diagram with an asterisk) in Felix Boothia, lat. 70° N. The progress of science having also established the correlation, or mutual dependence of heat and magnet-

* Dr. Kane says, "The intense beauty of the Arctic firmament can hardly be imagined; it looked close above our heads, with its stars magnified in glory; and the very planets twinkling so much as to baffle the observations of our astronomer."

ism, it may now be assumed that the magnetic pole of Boothia Felix stands on the parallel where, *at sea-level*, the influence of the sun's rays is at its minimum.*

The probability, therefore, of finding greater cold at the North Pole than elsewhere seems confined to the solitary chance of the Pole being covered by a lofty mountain-range, the elevation of which would render it a region of glaciers. Against this supposition we have, first, the spheroidal theory of the earth being flattened at the Poles, and next the fact, that on all sides on which the North Pole has been approached there have been found seas. In July, 1827, Sir Edward Parry stood upon floating ice within 435 miles of the Pole; and the ice drifting him southward, proved that there was not only sea, but open sea before him. On the 11th of August, the ice breaking up under him, he took to his boats, in latitude 81° 34', fifty miles from the nearest land.—Ross's Islet and Little Table Island, on the north-east side of Spitzbergen; before reaching which the thermometer rose to 41° Fahr., and not a trace of ice was to be seen in any direction. Could he, then, have jumped on board a screw-steamer, it is more probable than not that by returning northward he might have reached the Pole in three days!

The application of steam-power to navigation was then in its infancy; but strange it is, that, with the giant means now at our command, the value of the lesson then taught should still be overlooked. Its importance, even without steam, was long ago pointed out by General Sabine. Five-and-twenty years have elapsed since a paper of mine supporting his views of the Spitzbergen route appeared in the 'Westminster Review.'† In 1844 the Russian Admiral, Von Wrangell, in a letter to General Sabine, repeated his own conviction of open water at the Pole, and expressed his belief that it would be possible to follow and reach it by way of Spitzbergen. Subsequently, Dr. Petermann has frequently, and with great ability, brought the subject forward; but to this day no new expedition has left our shores in the direction of Parry's fourth voyage; the most likely one of all to lead us direct to our object!

Yet we must surely have now acquired sufficient experience to form a shrewd *guess* at least of the cause of our repeated failures.

It is not the ice at the Pole, but the ice drifting away from it, or circulating round it, in the Polar summer, and blocking up all approaches by narrow seas, that forms the great impediment to Arctic navigation. The problem is how to avoid being caught

* During a three weeks' sledge-expedition along this coast, ending March 14, 1849, Sir Leopold M'Clintock found the mean temperature 30° below zero of Fahr., or 62° below the freezing-point of water.

† Vol. xxxiv. for Oct. 1840, p. 523.

in this drifting ice of the surface currents, and get into the open water beyond. We have been attempting, for two hundred years, not to solve this problem, but to force a passage through an ice blockade to the north-west, along the coast of America, or to the north-east, along the coast of Asia, with the certainty, acquired beforehand, that in the whole stretch of those immense continents there is no opening by which the ice can escape. The voyager caught in the pack, along either of those coasts, must wait till it melts; and when the mass is too great to melt, in a northerly latitude, must perish, as the unfortunate crews of the *Erebus* and *Terror* perished in 1848.

There are but two outlets for the ice of the Arctic circle—Davis's Strait and the Greenland Seas. Behring Strait may be called a third outlet, but there the current sets inward. Davis's Strait is a wide channel, but not one-fifth of the breadth of the Greenland Seas, in the same parallel. It conducts due north, through Smith's Sound, to a strait 200 miles in length, which Dr. Kane, in the three summers of 1853, 1854, and 1855, and Dr. Hayes, in 1861, found choked up with hummocks and icebergs, and which Captain Osborn proposes we should again explore.* The direction of this frozen strait, ending in Kennedy's Channel, is all that can be desired; but, with the almost certainty of its not being found open, although with open water beyond, to reach it we have to creep along a cold and dangerous meridian, that of the western or Baffin's Bay side of Greenland, the glaciers of which, not to be crossed by land, are perpetually projecting icebergs into the sea. The opposite coast of Smith's Sound may, however, it is hoped, offer facilities for reaching the Pole by sledge-travelling.

Now, with an Admiralty chart before us, or with Mr. Wyld's little map of the Arctic regions in our hands (a third edition of which has been opportunely published), let us look at the position of Spitzbergen. It is in an ocean of which we were told in 1827, "that a ship might have sailed before the middle of August almost without touching a piece of ice, as high as latitude 82° N.;" † and where, if, notwithstanding, our progress northward, in a stout vessel, be baffled by ice, it is by ice that, having a perfectly free passage (at the proper season), merely drifts us back again, homeward, and no harm done.

A free passage for ice, by an outward current, carrying away

* Partly in the belief that "Dr. Kane departed from an Arctic canon by keeping on the eastern or lee shore, instead of the western or weather shore;" but in Dr. Kane's official report to the Secretary of the United States Navy, he states, "My first design on entering the pack (Aug. 1853) was to force a passage to the north; but, after reaching latitude 78° 45′ north, we found the ice hugging the American shore, and extending in a drifting mass completely across the channel."

† Parry's fourth voyage, last paragraph.

cold with it, implies, also, a free passage for the warm equatorial counter-current of the Gulf-stream; and thus, from a double cause, we get, along the coasts of Norway and Spitzbergen, a much higher mean temperature than on any of the meridians, in the same parallels of latitude, that cross the continents of North America and Asia. In Upper Norway, fine forest timber is growing in latitude 70° N.; while the ice blockaded coasts of Hudson's Bay (on the meridian of the Boothia Magnetic Pole) are barren of trees and shrubs, as low as 55° N. In Spitzbergen rain falls at Christmas; wild reindeer find subsistence throughout the year on alpine plants and mosses; and there the crews of whalers have repeatedly wintered, time out of mind. The great advantage, however, of this route is, that, for an attempt by navigation, there need be no wintering, except in cases of accident; for Spitzbergen, the south point of which is accessible all the year round, may be reached by steam, from London, in a fortnight, in the month of July; and, with an open sea, a voyage to the Pole and back would only be an affair of six weeks for a Cunard steamer. The distance of the Pole from Greenwich, let it be remembered, is a fourth less than that of New York.

Would it not be well, then, some day when Parliament is sitting, for the question to be asked in the House, or, otherwise, for a deputation to wait on the First Lord of the Admiralty, to inquire whether one or two steamers of our magnificent screw fleet, kept in readiness for war, and cruising occasionally as far as Malta and back to prevent their machinery rusting, might not, with advantage to the service, make, annually, a summer trip to the Greenland seas; if with no other result than that of familiarising our younger officers with navigation in high latitudes. Should the answer be in the affirmative, we might then, in the interests of science, venture to request an annual report of the direction of all currents, new lines of coast, and fixed and floating masses of ice, found in the neighbourhood of Spitzbergen; and for leave to be given the officers in command to go ahead, should they meet with an open channel.

For such preliminary expeditions, which would soon settle the question of the extent of the open water found by Sir Edward Parry, and with which might be combined a survey of the north-east coast of Greenland, no addition would have to be made to the navy estimates, beyond that which might be required for establishing at some point of Spitzbergen a depôt for coals and fresh provisions; and the vessels we send out need not leave port before the heats of summer render a northern breeze pleasant. With steam-power we have to economise coals, and nothing is to be gained but hard knocks (as serious off Spitzbergen as elsewhere) by buffeting with the ice-floes of spring. We should allow

(which has not generally been done) the sun fully four months from the vernal equinox for its work of ice dispersion in Polar seas. August is the month for maritime exploration,* and, with a week or ten days borrowed from September, would give ample time for all that should be attempted on a first voyage. Early in October our Arctic steamers should be again in the Thames, bringing with them, let us hope (if not this year, the next, or the next following), the glorious news that the dream of astronomers may yet be realised, and that there exists no practical obstacle to the erection of an observatory under *Polaris;* upon which depends the solution of many scientific problems of the highest interest, and the final corrections of all our latitudes and longitudes.

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It may be useful to add a few words upon the scientific objects to be attained by reaching the Pole, as contradistinguished from those of Arctic exploration generally.

The first object is that of obtaining reliable data for a knowledge of the exact figure of the earth; the importance of which to navigation is not well apprehended by the public at large, and may, therefore, here call for some brief explanation.

Astronomy enables us to determine, approximatively, the relative positions of different places on the face of the earth, but not their precise distances apart, in feet or yards, nor, when the distances are considerable, even in miles. An English mile is a definite length of 5280 feet, but the geographical miles and geographical degrees of our charts are variable terms. A geographical mile means the sixtieth part of a degree, and a degree is the three hundred and sixtieth part of the earth's circumference; but, owing to differences of the earth's curvature, a degree, which between London and Birmingham measures 69 English miles, measures 69½ English miles (north and south) on the Arctic circle, and but 68¾ English miles (north and south) on the equator. A geographical mile is 6080 feet at Blackwall (whence that number of feet is taken for the length of the *log* mile of ship measurement), but is only 6040 feet, measuring north or south from the equator, and is 6116 feet, north or south, from the Arctic circle.

Hence a fruitful source of shipwrecks; for, in thick weather, when observations of the heavenly bodies cannot be taken (which often happens for weeks together), a mariner must work his ship

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* *Time* is an essential element in Arctic exploration. Parry left with his sledges late in July, when, as the ice was beginning to break up, steamers, or even sailing vessels, would have been more useful. Spitzbergen would be an excellent starting-point for a sledge expedition to complete, on the north-east coast of Greenland, the American discoveries; but, for ice-travelling, it should leave in March.

by log and compass; and then, to the ordinary dangers of navigation, is added the risk arising from his ignorance of the exact number of log miles, or *knots*, to be passed over on the course he is steering before reaching a given point. With the utmost care of his "dead reckoning," and from no fault of his own, he may find himself some miles nearer a dangerous reef of rocks than the position in which he would have placed his ship had he known, with precision, the length of his geographical degrees.

Astronomers and geodetic surveyors are now quite at issue as to the rules that should be laid down for the guidance of mariners on this subject; especially since the discovery that deflections of the plumb-line and spirit-level from local attraction (not generally allowed for in taking latitudes and longitudes) are more general, and of greater extent, than had been suspected. General T. F. de Schubert, a high authority, holds the earth to be "an ellipsoid with three unequal axes,"* instead of a spheroid compressed $\frac{1}{300}$ part at the Poles, as supposed by Newton. M. O. Struve, the astronomer at Pultowa, writes that,† from the effects of local attraction, no zenith observations are to be relied upon in the neighbourhood of Moscow; and M. de Gumbach, after comparing the results of all the geodetic surveys hitherto completed, has revived the doctrine of Newton's contemporary, the first Cassini, that the equatorial axis of the globe is shorter than the Polar, and that the earth is not depressed but elongated at the Poles.‡

The data most required for determining this problem are measured lengths of degrees from and round one or other of the Poles, and measured lengths of degrees, east and west, along the equator; where, strange to say, as remarked by M. Le Verrier,§ only meridian surveys have yet been undertaken, and where M. de Gumbach asserts the true circumference of the globe will be found less by 167 miles than the received circumference, computed by theory.

The question of the exact figure of the earth involves another of equal importance to navigation, belonging to the compass—that of the exact direction of the four cardinal points. A mariner is told that the needle is subject to a periodic cycle of variations, east and west of the true north. But where is the true north? A point about 1° 36′ from *Polaris* is called the true north of the heavens,—the Celestial Pole. But where, precisely, is its representative on earth,—the Terrestrial Pole? Can any astronomer

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* Astronomical Memoirs for 1861.

† Communication to the Royal Astronomical Society, at the Meeting of 10th of April, 1863.

‡ 'True Figure and Dimensions of the Earth,' by J. Van Gumbach. Hardwicke.

§ Academy of Sciences, Sept. 1, 1862.

give us its bearings and distance from some known headland of the Arctic seas within a limit of error of five or ten miles? No; for the exact latitudes and longitudes of most places visited in the Arctic regions is doubtful. One of the nearest to the Pole, Cape Constitution, is placed by American hydrographers in latitude 81° 22′ N., and by Mr. Arrowsmith in 80° 56′ N.; a difference of 28 miles! This uncertainty arises from the almost horizontal path of the heavenly bodies, as seen in high latitudes; which interferes with the simpler methods of astronomical observation. At the Pole, for example, the sun at Midsummer sails round and round the horizon for nearly a week together at a uniform altitude of 23° 28′, plus refraction. It has no culmination. The hour of noon might, then, easily be mistaken for that of midnight, and is only to be determined approximately, by chronometers.

Hence, and for other reasons, the discovery of some island or continent in which the Pole may be situated (and let us hope it is not in the dominions of Neptune), although no mean achievement, will not probably be found so difficult an undertaking as the *identification* of the Pole, when found, to the satisfaction of science. Our first explorers may be able to assure us that they have sailed round the Pole, or landed and camped somewhere near it, but this is a very different thing from marking out the exact spot which constitutes the most northerly point of the globe. A geodetic surveyor, having to adopt it as his measuring point for all areas of meridian, will require to have the Pole so defined by astronomers that he shall be enabled to trace out, under their direction, as the terrestrial representative of the celestial Pole, a circular area of 100 feet radius, the centre of which shall be latitude 90° N., and the circumference of which shall be one second less, or 89° 59′ 59″ N. Before this can be done, a long series of observations, from the approximate area first fixed upon, and spread over a year at least, must be completed and compared; especially for the two solstices and the two equinoxes; the reason being that from many different causes, some of them not understood, the *apparent* positions of the heavenly bodies always vary somewhat from their calculated positions,* and that the full extent and *mean* of such variations have to be allowed for, in all cases of latitudes and longitudes, whenever the precision of a second is aimed at.

Besides the orbital and diurnal motions, observations at the Pole would be affected by—1. *Precession;* a motion of the earth, and perhaps of the whole solar system,† round the Pole of the Ecliptic,

* The Greenwich Observations for 1859 show a range of apparent errors in the vertical diameters of the sun, computed for the Nautical Almanac, of nearly 9″; that is, from +4·61 on March 2 to −4·12 on the 24th May.

† From changes in the apparent position of the fixed stars Dr. Maskelyne and Sir William Herschel were led to conclude that the sun moved in an orbit of its

at the rate of 50″2549 annually; complete in 26,868 years; changing, therefore, continuously the apparent longitude of the stars; but held by most astronomers (some doubting) to be so perfectly horizontal as not to affect their latitude. 2. By *Nutation*, an oscillatory movement of two kinds, horizontal and vertical; the horizontal involving a correction for longitudes, and the vertical for latitudes,* the extreme range of which is 18″ in a cycle of nearly 19 years; affecting to that extent, for the same period, the obliquity of the ecliptic. 3. By *a displacement of the plane of the ecliptic* (*i. e.* a change of angle in the direction of the earth's orbital path), affecting its obliquity more permanently and continuously; and which has diminished the latitude of certain southern stars, and augmented that of corresponding northern upwards of 20′ since the days of Hipparchus and Ptolemy.† 4. By *the motion of the earth's apsides* (or changes, laterally, of solar distance); planetary disturbances varying the eccentricity of the earth's orbit. And 5. Possibly, by what Newton called *an evagation of the Poles;* that shifting of the earth's axial line of rotation which might arise from any unequal enlargement or diminution of the earth's mass, by foreign influences; ‡ in which case the spot we may now fix upon as the Pole would not be the Pole of some future century.

These considerations make it very desirable that if the Pole be found accessible, and its climate not too unfavourable, arrangements should be made for establishing there, for at least some years, a permanent station; § that the work of Polar identification

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own, carrying the planets with it. This conjecture has been strengthened by the observations of Argelander, Otto Struve, and Bravais. In 1834 the Rev. H. M. Grover, of Hitcham Rectory (an able mathematician), pointed out in his 'Theory of the Sun's Orbit,' that the sun's proper motion would adequately account for all the phenomena of precession; and the same idea has since been advanced by others.

* It is now doubted whether this effect should be described strictly as a *nutatio*, or "nodding" to and fro of the earth's axis. The apparent oscillation may not be in the axis, but in the ecliptic; and be occasioned by a spiral and epicyclar movement of the earth about the plane of its orbit.

† 'En. Brit.,' Art. Astronomy, by Thomas Galloway, F.R.S.

‡ It has been shown, conclusively, that this could hardly result from the elevations and subsidences of volcanic agency, the internal forces of which must be governed from the first by the diurnal motion; but a more potent cause of possible evagation exists in the unequal action of the sun's rays; the effect of which is a constant wasting of the earth's solids by their volatilization in some parts of the world, while other parts are receiving continual accretions by precipitation.

§ As stations in the Arctic seas are required for various objects, let me, here, offer a suggestion. Our colonies refuse to receive convicts. Russia sends hers to Siberia. Why not send ours north, likewise; where their labour could be utilised? The discovery of coal strata in the Parry Islands has removed the main difficulty; which has not been want of food, but want of fuel. The work of excavating coal, in underground galleries, could be as easily carried on in Arctic regions as at Newcastle. A few coaling stations, at intermediate points, to be used besides for depôts of provisions, and as places of refuge, may one day render a voyage to British Columbia, at the right season, *viâ* the Pole and Behring Strait, an every-day enterprise.

may be so performed (astronomical commissions of different nations taking part in it) that no future question may arise about the place of the Pole of our own day, and of its exact bearings, celestial and terrestrial. If there be no granite peaks in the neighbourhood by which its position could be geodetically defined, the leading states of Europe and America would confer an immense boon upon posterity by combining to erect there a monument as enduring as the pyramid of Gizeh, from which could be read in the changed aspects of the heavens the history of the earth's past and future: for it is principally from data to be obtained at the Pole that we have to expect an answer to the question geologists have long asked of astronomers, "What is the cause of those changes of climates we find recorded in the earth's crust?"

We know from fossil remains, the coal formations, and the cargoes of bones of *mammalia* freighted annually from Siberian seas, that there must once have been a time when animal and vegetable life abounded in Arctic regions; and the recent melting of ice found to have been the tomb of extinct mammoths, would seem to indicate that it is approaching again.

The probability of such a change turns principally upon the causes of that *displacement of the plane of the ecliptic* alluded to, which is slowly but progressively diminishing its angle of obliquity. Our highest mathematicians hold the uniformity of the earth's rotatory motion to involve a perfect parallelism of the earth's axis; but a change of plane in the earth's path affects the earth's solar aspects exactly in the same way as a change of direction in the earth's axis, with the plane of orbit remaining constant. The obliquity of the earth's path in reference to the plane of the equator (or, what is the same thing, the obliquity of the angle made by the Pole of the ecliptic and the Pole of the equator), as measured by Eratosthenes, 2000 years ago, was 23° 51′ 52″; it is now 23° 27′ 26″; at which rate of diminution the two planes would meet in about 100,000 years. The rate is now slower—about 45″ in a century; the causes commonly assigned for it (the perigee and apogee, or approach to and departure from the earth's path of other planets) accelerating the diminution at one time, and retarding, arresting, or counteracting it at another. Assuming the varying positions of Mars and Jupiter to be the principal cause of ecliptic displacement, M. le Verrier has calculated the change of obliquity to be confined within a range of 9° 44′; but no one has yet been put in possession of all the elements required for a solution of this problem. The value, for example, of the aggregate mass of the eighty-three planetoids recently discovered has to be determined; and, if we are to accept the doctrine that the sun has an orbit of its own, and that its present orbital path is in the direction of a star in the constellation Hercules, north and west of the plane of the ecliptic (shifting, therefore, more and more to the

north-west, in the orbit of every planet, the solar centre of gravitation), the dynamic consequences of such a movement have to be computed.

The Egyptian priests of antiquity had a tradition that the ecliptic was at one time at right angles with the plane of the equator; an idea to which they may have been led by the diminution of obliquity now in progress (observed, perhaps, in their day); for a ratio of decrease in the present is of course a ratio of increase for the past: and if, in looking backward, we have no rule where to stop, we must of course reach at last an angle of 90°; when the question arises whether the plane of all orbital paths may not *revolve* as well as oscillate. The varying inclination of the orbits of all the heavenly bodies, for which no cause has been assigned, is a reason for not considering a complete revolution of their planes impossible. While the plane of the path of Jupiter differs from that of the earth but 1° 18′ 40″, and Mercury but 1° 51′ 5″, Mars departs from it 7° 0′ 8″, and Pallas 34° 43′ 17″. The satellites of Uranus revolve in a plane perpendicular to that of their primary, and the comet of June, 1861, dropped down upon us from the circumpolar stars at an angle of 85° 58′.

As the change of seasons depends upon the obliquity of the ecliptic, and the extent of that change upon the degree of obliquity, the evidence offered by geology of the temperate regions of the globe having been subject to extreme alternations of heat and cold, supports the conclusion that our own orbital path must at some period have formed a much wider angle with the plane of the equator than at present. An angle of 90° represents (*cæteris paribus*) the maximum of possible alternation; an angle of 45° the mean of possible alternation; 23° 28′ the present alternation; which angle, reduced to *nil*, leads us to the minimum, or zero of possible change, in equable temperatures throughout the year.

An ecliptic at right angles with the plane of the equator would bring the sun at the North Pole at Midsummer into the zenith, where, remaining throughout the twenty-four hours, it would, by its continued action, produce an intensity of heat, over the whole Arctic circle, far greater than that now experienced in the Torrid Zone. After the autumnal equinox, the gradual cooling of the atmosphere, and condensation of aqueous vapours the sun had exhaled, would occasion deluging rains, and then overwhelming falls of snow; followed, on the approach of the winter solstice, (when the sun would sink 90° below the horizon), by a glacial epoch, that would lock up in ice at least one-third of the northern hemisphere. These changes, powerfully influencing all atmospheric and ocean currents, would necessarily be accompanied by storms, and convulsions of great violence.

A progressive diminution of obliquity is a tendency towards

quite an opposite state of things,—one of a universal calm, free from physical disturbances of any kind. A near approach of the two planes would bring about, as in the planet Jupiter,* equal days and nights all over the world, throughout the year, with equal temperatures; the latter varying only with latitude. From the equator to the British Isles there would reign perpetual summer, and, farther north, perpetual spring. Winter, in its severer forms, would be banished from the globe (the sun at the Poles being always on the horizon); and the only winds that would prevail would be trade winds, blowing constantly from the same quarter.

It becomes, of course, no student of science to dwell upon such eventualities, further than as a tentative process for the discovery and understanding of facts. The point for his attention is that we want far more information than we possess of the causes that govern the present inclination alike of the earth's orbit and that of the earth's axis, both of which (however strong the presumption against change of axis), may have a concurrent variation; and that the business-like way to obtain the data we desire is to establish astronomical and geodetic stations at such extreme points of the earth's circumference as would settle the question of the earth's figure, and of its exact angular position in all apparent perturbations of the heavenly bodies.

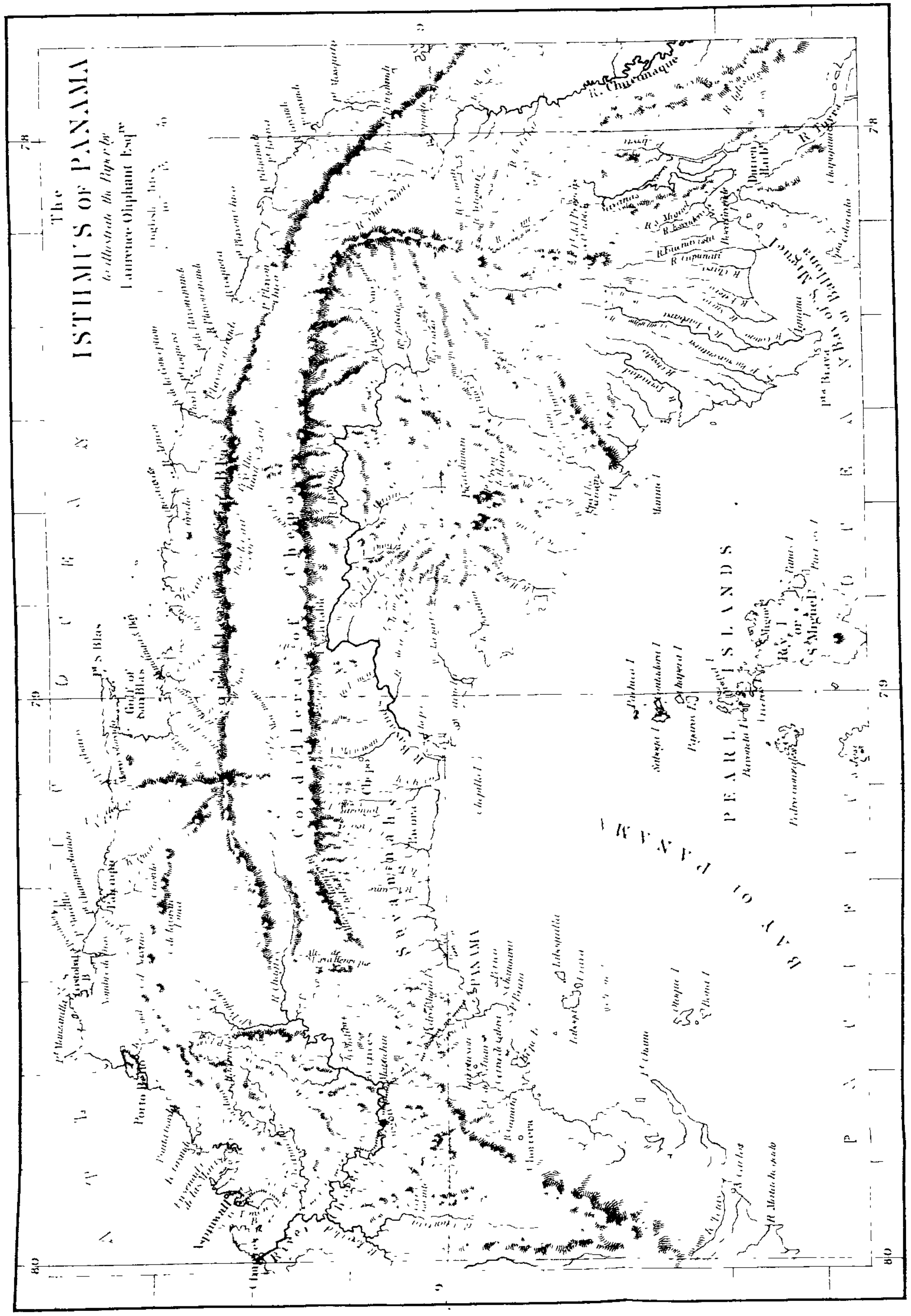
## XI.—*On the Bayanos River, Isthmus of Panama.* By LAURENCE OLIPHANT, Esq., Secretary R.G.S.

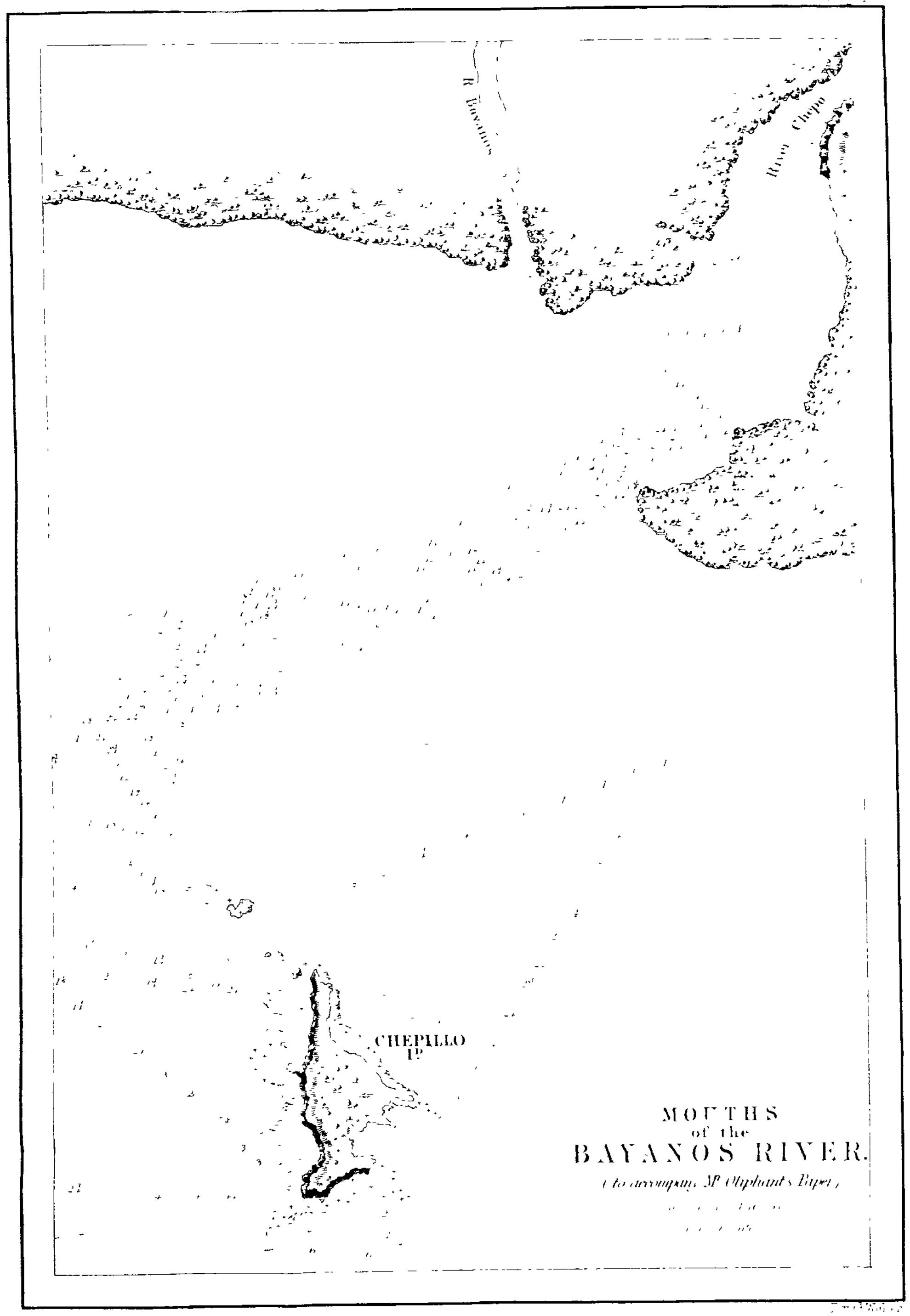
*Read*, April 24, 1865.

THE practicability of uniting the Atlantic and Pacific Oceans by means of a ship-canal has long occupied the attention not only of geographers, but of men of science and of commerce. It is not my intention now to recapitulate the various schemes which have been set on foot to accomplish so desirable an object, or to enter upon a narrative of the different expeditions which have been fitted out at great trouble and expense to explore impossible routes, and to return with the same tale of failure, and sometimes of disaster; suffice it to say that, from one cause or other, no less than seven projects have fallen to the ground, and the public seems to have abandoned in despair the idea of achieving a work of such incalculable benefit to the world at large. It may be that they are right, and that the enterprise will in point of fact turn out not to be feasible; but this is a conclusion which no one has any right

* The obliquity of Jupiter is but 3°6'; this, however, arises not from any divergence of its orbital path, which is nearly on the same plane as that of the earth, but from the greater perpendicularity of its axis.

dropped anchor under the lee of the small island of *Chepillo*, which lies off the mouth of the river, and which forms a protection for small craft. As, in the event of a canal being practicable


The
ISTHMUS OF PANAMA
to illustrate the Paper by
Laurence Oliphant Esqre
Gulf of San Blas
Cordillera of Chepo
PANAMA
BAY OF PANAMA
PEARL ISLANDS
R. Chucunaque
R. Bayano


R. Bayanos
River Chepo
CHEPILLO Id
MOUTHS
of the
BAYANOS RIVER.
(to accompany Mr Oliphant's Paper)

whatever to assume, considering that the narrowest part of the Isthmus of Panama has never yet been crossed, much less explored, by any white man. The neck of land which divides the Atlantic from that point on the Bayanos River to which the tide of the Pacific extends is only fifteen miles across; and however incredible it may seem, it is nevertheless true, that no record exists, so far as I have been able to discover, to prove that those fifteen miles have ever been traversed up to this time. There is, indeed, a report that in 1786, when a detachment of Spanish soldiers were garrisoned on *Mandinga Bay*, on the Caribbean Sea, letters were conveyed from *Chepo* to that point by a negro corporal, escorted by four men. Dr. Cullen mentions having seen this man, then 101 years old, but we have no record of any Spaniard ever having made the same traject. In 1837 Mr. Wheelwright attempted it, but was driven back by the Indians; and some years later Mr. Evan Hopkins started, with the view of exploring this route, but was compelled to abandon it for the same reason. The man who has done more to survey this part of the isthmus than any other is Colonel Codazzi, of the New Grenada Engineers; but though his maps are valuable as giving the altitude of the highest points of the Cordillera, the most important feature, so far as a canal is concerned, is its greatest depression; and I have not been able to ascertain that either he or any of his subordinates have crossed the isthmus at the point where the Atlantic and Pacific most nearly approach each other.

While at *Panama* I made numerous inquiries with the view of satisfying myself on this point; and, finding that this tract of country was entirely unknown, I gladly availed myself of the invitation of a Frenchman, Spaniard, and a German, who were going to the *Bayanos River*, where they had bought a property which they wished to visit. Mr. Gerald Perry, son of our consul at Panama, accompanied us on this expedition. I proposed to our companions an exploration of this part of the isthmus; but their interest in geographical discovery was not sufficiently strong to induce them to entertain the idea, and I had neither the time nor the means at that moment to organise an independent expedition. I therefore determined merely to make a reconnaissance, and be guided by circumstances as to the length of time I should spend upon it. It is not above thirty miles from *Panama* to the mouth of the *Bayanos River*. We left Panama in a small half-decked cutter at midnight, and found ourselves at daylight the following morning vainly striving to force an entrance against a strong head-wind and tide. Finding it hopeless to continue against these adverse influences, we dropped anchor under the lee of the small island of *Chepillo*, which lies off the mouth of the river, and which forms a protection for small craft. As, in the event of a canal being practicable

across the isthmus at this point, this would be its western entrance, the capabilities of the Bayanos River as a port of entry are of the first importance.

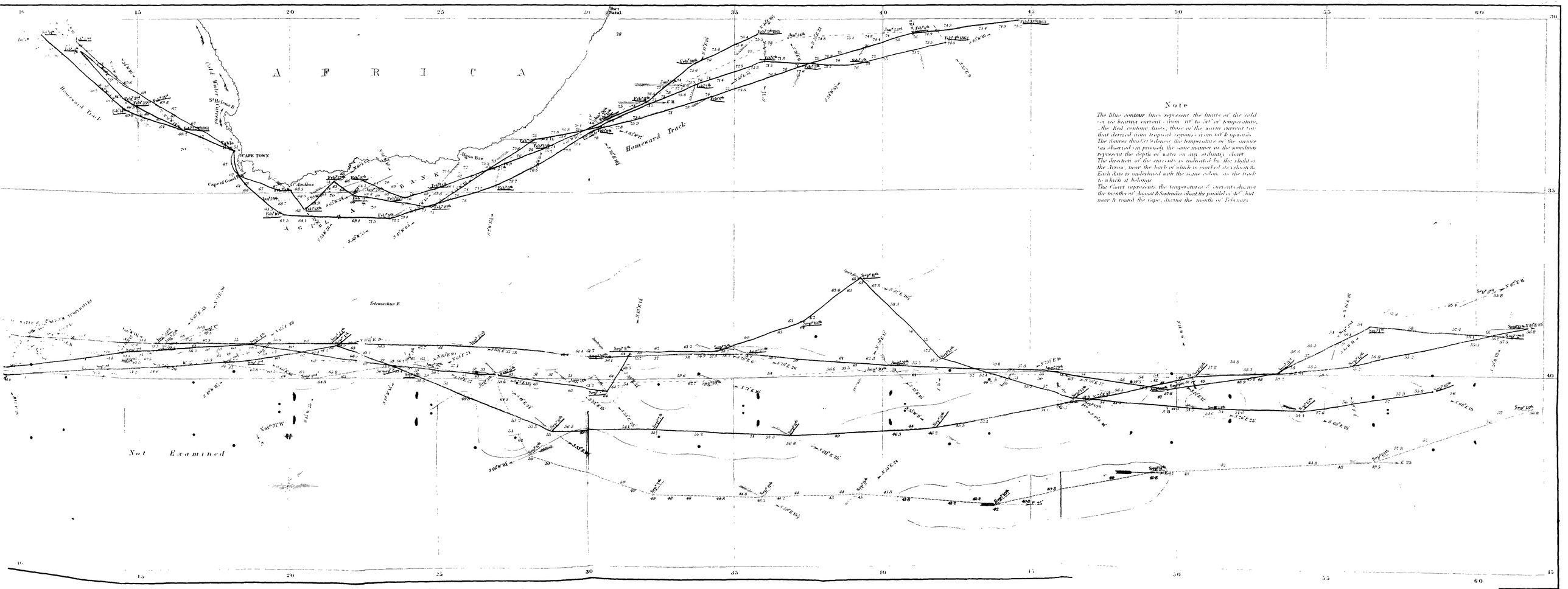
Dr. Cullen, who employed himself for some time projecting a ship-canal across the isthmus from the Gulf of San Miguel, states that this route is impracticable, on grounds from which I must take leave to dissent. The bar at the mouth of the Bayanos River he asserts to be dry at low water, the island at its entrance an obstruction in the shape of a mere sandbank, and the Cordilleras ranging in altitude from 2000 to 6000 feet. From personal observation I can state, that at the lowest time of the tide, there is 8 feet of water on the bar of the Bayanos River, that the island of Chepillo is a low, well-wooded island, a mile long and half-a-mile wide, inhabited by several Mestizo families, and that the Cordillera in this part of the isthmus nowhere, according to Colonel Codazzi's survey, attains an altitude of more than 2625 feet, while in places it is depressed, as far as I could judge by the eye, to half that elevation. At low-water sandbanks extend on both sides of the river entrance for about two miles from the shore, but as there is a clear channel three-quarters of a mile wide, and from 2 to 3 fathoms deep, there is no impediment to the navigation when once the bar is crossed. The island is a little more than half-a-mile from the point of this sandbank, and would probably be available in forming a future harbour at this point. According to Admiral Kellett's survey, the tide has a rise of 16 feet, which would give about 4 fathoms on the bar at high water. All that would then be necessary would be a sheltered anchorage for ships while waiting for the tide, and this would seem to be rendered practicable by the position of the island of Chepillo; but on this point I do not feel competent to express a decided opinion. Between three and four miles above the mouth, the river narrows to about 200 yards, still keeping a uniform depth of water. The banks were magnificently wooded. The light green mangroves which fringed the water were backed by noble forest-trees, in the branches of which troops of monkeys joined their chattering clamour with the screaming and twittering of flocks of gaudy paroquets. Gaily we glided up the quick stream, and passed creeks which lost themselves in the gloomy woods, and looked black and mysterious in the fading light. We anchored for the night between shores which were flat and apparently swampy; there were no signs of any habitations. On the following morning the shores assumed a bolder character, the stream was still dark and sluggish, and we left it to ascend its tributary, the Mammonie, at a point where it was about 100 yards broad. The influence of the tide extends to Fort Terable, about eight miles higher up the river. This was the point I had proposed to visit,

for it is the extreme outpost of civilization, and was originally built by the Spaniards as a frontier post; it is now inhabited only by a few Mestizos, and the only man I met who had ever been there was Don Pepe Hurtado, who had described to me at Panama the impossibility of going a yard further, on account of the Indians. It is from this point that an expedition to Mandinga Bay should start; and I was repeatedly assured, both at Panama and at Chepo, that the Darien Indians were in the habit of hauling their canoes on wooden slides across the Cordillera from the Mandinga River, and launching them in the Bayanos. I only give this as a current report; but it is one which possesses some significance, as I am not aware that any such reports exist with reference to any of those varied routes which have been proposed, and in some instances actually surveyed. Surely it is a discredit to the civilization of the 19th century that the Indians should be said to pass with boats from the Pacific to the Atlantic, and that we should never have had the curiosity to verify this fact, or to explore the only section of the isthmus of which it could be stated with any appearance of truth. My companions, unfortunately, insisted upon proceeding in the first instance to Chepo. They then proposed to return to the Bayanos and visit their property, and then gave a sort of doubtful promise that, if I very much wished it, they would accompany me to Terable. I reluctantly left the main stream to turn up the petty tributary, the size of which may be best judged from the fact that in two hours we were obliged to leave the cutter for want of water, and betake ourselves to native canoes. Three of these we appropriated at the first huts we had seen, and in them forced our way for some hours up the rapid current, sometimes obliged to get out and wade, and pull them after us, and always, on account of their rickety character, running the risk of an involuntary bath.

Chepo is situated on a swelling knoll in the broad savannah, about three miles from this stream, and contains a population of about 1000 Mestizos and negroes. Most of the houses are square huts of split cane, with conical thatched roofs. The lower spurs of the Cordillera extended to this point, so that we could judge of the aspect of the chain, and of a very remarkable depression in it, certainly not more than ten miles distant, but which had never been visited. That such could be the case seemed scarcely credible; yet it was fully accounted for by the reports we received of the character of the Darien Indians, who, it appears, let these outposts of civilization alone, provided their inhabitants keep within their own boundaries, but who mercilessly attack any one invading the sanctity of their own primeval forests. The idea of any one attempting to go beyond three or four miles into the mountains from Chepo was treated with derision, and I saw that it would be useless, therefore, my going to Terable. I should not have a

better view of the range there than I had from Chepo, and the impossibility of attempting to strike across the isthmus would be just as great; moreover, I was quite at the mercy of my companions for means of transport, and as their movements depended on business, I might be obliged to remain a week with them at their new hacienda before being able to proceed. Under these circumstances I decided, instead of returning to the Bayanos River, to ride across the country from Chepo to Panama. The result of my observation was the conviction that in order to undertake this expedition with any chance of success, a very strong armed party, consisting of not less than 50 or 60 men, should be organised at Terable; or possibly it might be found more practicable to start from Mandinga Bay, where a few trading Mestizos are also settled, and where the projecting Cape of San Blas secures a sheltered anchorage. Unless there are Indian paths which would facilitate their transit, the exploring party would have to cut their way through the dense forest, and could not possibly, under the most favourable circumstances, hope to accomplish the fifteen miles in less than four days. During this time they would be exposed, probably, to the incessant attacks of the Indians, whose principal implement of warfare consists of the borokero, or blowpipe, through which they puff poisoned darts with the most unerring accuracy. The insidious nature of this weapon, and its immediate and fatal effect, has doubtless really prevented any exploration of this section of the isthmus. Let us hope that the time will come when it will no longer be in the power of a few savages to deprive the civilized world of what may prove an incalculable benefit to it. The current opinion in Panama is that the Indians know they possess the much coveted secret, and that they have so jealously guarded these valleys of the Cordilleras because through them alone could pour that tide of commerce and of civilisation before which they would inevitably be swept away.

Our way from Chepo to Panama lay chiefly through open savannah country. On the right the wooded range of the Cordilleras, here depressed to an average altitude of not more than 1200 or 1500 feet above the sea-level, presented an irregular outline; to the left the country stretched away in gentle undulations seaward, the bottoms well wooded and marshy, the hills covered with long waving grass, admirably adapted for grazing purposes; the population is, however, sparse and scattered. During a seven hours' ride we only passed one insignificant village; and not until we arrived at the haciendas of Pass El Blanco and San Antonio, did we see hundreds of head of cattle luxuriating in the rich pasture. At the latter of these we passed the night, and were off again soon after daylight, across a never-ending succession of grassy hills. Sometimes broad belts of timber divided the meadows, and looked like the wooded banks of a wide river of verdure.


A F R I C A
Cape Town
Table Bay
Cape of Good Hope
Agoa Bay
Algoa Bay
Port Natal
Cold Water Current
Homeward Track
Homeward Track
Telemachus R.
Not Examined
Note
The Blue contour lines represent the limits of the cold or ice bearing current from 30° to 50° of temperature.
The Red contour lines, those of the warm current or that derived from tropical regions, from 60° to 82° upwards.
The figures thus 60 between the temperatures of the surface as observed in previously the same manner as the soundings represent the depth of water on any ordinary chart.
The direction of the currents is indicated by the shafts of the Arrows, near the bath of which is marked its velocity.
Each date is underlined with the same colour, as the track to which it belongs.
The Chart represents the temperatures & currents during the months of August & September about the parallel of 40° but near & round the Cape, during the month of February.

Here horses and oxen were to be seen dotting its smooth surface as they waded about, showing little more than their backs over the grass. At last the evidences of civilisation increased as we approached Panama, and after two days' hard riding we were glad to spur our jaded steeds along its narrow streets.

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XII.—*On the Specific Gravity, Temperature, and Currents of the Seas passed through during Voyages from England to India, leaving England July 1st, and returning about the middle of April.* By HENRY TOYNBEE, F.R.A.S., and F.R.G.S., Master Mariner.

*Read*, May 8, 1865.

THE constant repetition of certain facts, recurring in the same place at the same time of year, observed on five of these voyages during the last five years, has led me to think that they may be interesting to the Royal Geographical Society, as pointing to some important conclusions in the physical geography of the sea.

First, the specific gravity of the sea seems to average about 1·027 in the higher latitudes, both in the North and South Atlantic and the Southern Indian Ocean, and to decrease on approaching the Equator; for instance, towards the end of July, in 16° or 17° N. lat., it is about 1·026, in 15° N. lat. it is about 1·025, and in 8° N. lat. it is 1·0245, which is the lowest specific gravity we get on the outward passage in the Atlantic Oceans. There can be little doubt but that the cause of this decrease is the rain which falls between the north-east and south-east trades: the sun being far north at this season of the year, the north-east trades only extend to about 15° N., and a south-west monsoon is met with about 12° N., which turns into the south-east trade in about 4° N. On our homeward voyage, early in March, the lowest specific gravity in these latitudes is 1·023 in about 3° N. lat., the north-east trade at that season extending as low as 4° N. lat.

In the Southern Indian Ocean the mean of five voyages gives the specific gravity as follows:—

| | | Specific Gravity |
|---|---|---|
| 36° S. lat. 79° E. long. | Middle of September .. .. Temperature 82°. | 1·0271 |
| 26° S. lat. 82° E. long. | Middle of September .. .. Temperature 70°. | 1·0257 |
| 16° S. lat. 80° E. long. | End of September .. . Temperature 76·5°. | 1·0248 |
| 30° S. lat. 44° E. long. | Early in February .. .. Temperature 70°. | 1·0253 |
| 26° S. lat. 73° E. long. | End of January .. .. . Temperature 78°. | 1·0246 |
| 10° S. lat. 83° E. long. | Middle of January .. .. Temperature 81°. | 1·0235 |

# CHART OF THE CURRENTS

OFF THE

# CAPE OF GOOD HOPE

*To accompany* CAPT^N TOYNBEE'S *Paper 'On the Specific gravity Temperature & Currents of the Sea', the result of a portion of five Consecutive yearly Voyages from England to India*

Projected from the Log-books by S Com^dr C George, Map Curator R G Soc^y

*Capt^n Toynbee's track outwards* 1860
" 61
" 62
" 63
" 64

Nautic Miles

100 50 0 100 200 300

*Outward Track*

Tristan d Acunha

Gough's I.

PATCH OF WATER

showing that the rain which falls south of the Line in January and February tends to lower the specific gravity of the whole ocean, for in September it is 0·0001 to 0·0002 higher than in January.

In the Bay of Bengal the mean of five voyages gives :—

| | | Specific Gravity. |
|---|---|---|
| 20° N. lat. 88° E. long. | Middle of October .. .. Temperature 82°. | .. .. 1·020 |
| 20° N. lat. 85° E. long. | End of December .. .. Temperature 76°. | .. .. 1·022 |

This difference may be imputed to the freshes which flow from the Ganges, Godavery, and other large rivers in October, as well as to the large amount of rain at that season.

Secondly, I will remark on the temperature of the surface-water, which I have been in the habit of observing five times a day.

We passed the Cape Verde Islands towards the end of July each voyage, three times to the eastward, and twice to the westward of them. In 20° N. lat. the temperature of the sea was 73° to the eastward, and 75° to the westward of them. This cooler sea may be caused by part of the cold-water current which flows to the northward along the western coast of Southern Africa.

About the 29th of July, in 8° N. lat., we met with a surface temperature of about 81°, and the current setting to the eastward: while on the Equator, during the first week in August, we came upon a cold current. As it may be useful for reference, I give the data extracted from the five logs, which shows the coldest water experienced on crossing the Line :—

| Date. | Latitude. | Longitude. | Specific Gravity. | Current: Direction and Rate in 24 Hours. | Surface Temperature. | Remarks. |
|---|---|---|---|---|---|---|
| 1860. | ° ′ | ° ′ | | ° m. | ° | |
| Aug. 6 | 0 6 N. | 27 48 W. | 1·0257 | N. 87 W. 57 | 75 | |
| 1861. | | | | | | |
| July 31 | 0 30 N. | 20 44 W. | 1·026 | N. 30 W. 19 | 74·2 | From 2° N. to 1° N. the sea was 74·5 |
| 1862. | | | | | | |
| Aug. 9 | 1 51 S. | 27 3 W. | 1·026 | S. 60 W. 46 | 75·4 | |
| 1863. | | | | | | |
| Aug. 4 | 0 07 N. | 17 26 W. | 1·0255 | N. 24 E. 18 | 69·9 | Between 3° N. and 7° N. the sea was not above 75°; between 1° 30′ N. and 0° 30′ S. it was 70° to 71° |
| 1864. | | | | | | |
| Aug. 2 | 4 57 N. | 16 54 W. | 1·0255 | N. 22 E. 25 | 75 | Between these observations the water was 79°, on the 3rd and 4th the current set to the N.E., and on the 5th and 6th to the S.W. |
| ,, 7 | 2 25 S. | 28 00 W. | 1·0255 | S. 72 W. 30 | 75·3 | |

It will be seen here that twice in 17° W. the cold water was going to the north-east. In 1864 we came into the cold water

again in 28° W. long., when it was setting to the south-west, 30 miles in 24 hours. Between these two cold spots the temperature was up to 79°. One is naturally led to conclude that this cold water comes from the southward, and curves sharp to the westward shortly after crossing the Line, in about 17° W. long. The further east, the colder the water: once from 1° 30′ N. lat. to 0° 30′ S. lat., even down to 70°, making the air quite cool and damp, with a slight haze, and this when the south-east trade had set in steadily, with blue sky and *no rain*.

On the homeward voyage, when crossing the Line early in March, this cold current seldom differs more than two or three degrees from the surrounding sea. If we suppose that this cold water travels north along the west coast of Africa, it may well be colder in August, after a southern winter, than in March, after a southern summer. It is a curious fact that we find water off the Cape 8° warmer than this equatorial current.

Not having been east of the meridian of 17° W. when crossing the Line in the Atlantic, I am not able to say how near the coast of Africa the cold-water current runs, but as the water on the Agulhas Bank and in Table Bay is cold, I suppose it keeps close in to the land. Maury's chart of sea-drift, &c., in that invaluable work, his 'Sailing Directions,' leads us to expect that the sea-water travels *south* along the West Coast of Africa. The small black arrows on the accompanying chart show the direction in which I think the cold current runs.

Towson, in his useful pamphlet on 'Icebergs in the Southern Ocean' (printed for the Board of Trade and Admiralty), gives a chart on which he describes the tracks of icebergs. I have found that the tracks of icebergs extend much further to the eastward than Towson indicated on his chart.

His data lead him to suppose that they come to a standstill in 40° S. lat. and 15° W. long., and then, after hanging for some time, move off to the south-eastward. Now, this is confirmed by our having for five voyages passed through a patch of cold water, sometimes down to 47°, in about 39° S. lat. and 5° E. long., which is, I suppose, the spot in which we come nearest to the curved lines on his chart which show the direction of the ice-bearing currents. The table (p. 150) gives my observations in this cold spot, and it will be noticed that, with one exception, the current was to the south-east, as Towson would lead us to expect.

Again, the water on the Agulhas Bank and in Table Bay is remarkably cold, showing that its source is not the Mosambique current. Lying at anchor in Table Bay in February (the corresponding month to our August), we found the water down to 51° (the same temperature as we found at the entrance of the English Channel in March), when the day before we entered the bay in

35° 16′ S. lat. and 22° 54′ E. long., it was 70·5°; and four days before, in 33° 15′ S. lat. and 30° 40′ E. long., it was 78·3°. Again, after running 90 miles due west from Table Bay, the temperature of the sea rose 19°. We may naturally conclude that Table Bay gets its cold water from this ice-bearing sea, and that the same water runs northward along the west coast of Africa, and forms the Atlantic equatorial current, and is also one of the causes of the dampness from which the West Coast of Africa suffers. No doubt the inhabitants of Cape Town are benefited by the cold water of Table Bay in several ways; one may leave the town overcome with heat, and find the temperature of an English March on board a ship at anchor in the bay. They may also thank it for the abundance of fish which may be had just for the taking. When lying there in February of this year, my crew were hauling in large crawfish almost as quickly as they chose, and the fishermen of the place beating about were catching snook (*Thyrsites Atun*) in the same profusion, making the whole bay a scene of most picturesque and enlivening interest.

One can scarcely avoid contrasting the climates of Natal and Cape Town. The former is said to abound in tropical productions which will not grow at all in the latter. No doubt the cause of this is that Natal has a current of a temperature of 78° running by it all the year round, while Cape Town is surrounded with a cushion of cold water down to 51° in the height of summer.

| Date. | Latitude. | Longitude. | Specific Gravity. | Current. Direction and Rate in 24 Hours. | Surface-Temperature. | Remarks. |
|---|---|---|---|---|---|---|
| 1860. Aug. 31 | ° ′ 39 50 S. | ° ′ 2 45 E. | 1·027 | ° m S. 74 E. 14 | ° 47·2 | In this cold water we had ragged-looking hail-squalls: the sea kept cool to 39° 14 S. and 14° 37′ E., when it suddenly rose 15°. |
| 1861. Aug. 21 | 38 39 S. | 5 18 E. | 1·0275 | S. 77 W. 10 | 49·7 | A heavy squall the sea 8° warmer the next day. |
| 1862. Sept. 1 | 40 06 S. | 9 41 E. | 1·027 | In 3 days. S. 12 E. 62 | 48·8 | Sharp squalls the sea 7° warmer the next day. |
| 1863. Aug. 23 | 38 18 S. | 5 20 E. | 1·027 | S. 86 E. 38 | 51 | High W.S.W. sea the sea 10° warmer the next day. |
| 1864. Aug. 29 | 39 24 S. | 6 40 E. | 1·027 | In 3 days S. 42 E. 45 | 50 | Wind shifted to W. in a squall the sea 15° warmer in 14° 56′ E. long. |

We will now return to the patch of cold water in 39° S. lat. and 5° E. long., where sharp hail-squalls and unsettled weather prevail. From this position we endeavour to steer east, keeping in about 40° S. lat., and when in about 17° E. long. we have each voyage suddenly come into water above 60°. By the time we get to 23° E. long. we have our warmest water, sometimes up to 67°; but the

most remarkable part of it is, that we pass through *streaks* of hot and cold water, although sailing along in the same latitude. This kind of remark is very common in my logs:—9 A.M., long. 18° 20′ E., surface-water 55°. 3 P.M., surface-water up to 67°. These fitful changes are quite the order of the day in 40° S. lat., from the meridian of Greenwich to 50° E. long., where we have each voyage come into a colder patch of water, sometimes down to 40°. In the changeable water we have a very high confused sea, and in this colder patch frequent hail-squalls. The current is generally to the eastward, seldom exceeding a mile an hour; though once in 24° E. long., whilst passing from water at the temperature of 66° down to water at 56°, we experienced an easterly current of 80 miles in 24 hours. (See foregoing Table).

The streaks of warm water contain all the beautifully-shaped and coloured shells and crustaceans which we have found in the equatorial regions, whilst the streaks of cold water have a different class of inhabitants. The specific gravity of the cold water is about 1·027.

Here is the table extracted from five logs:—

| Date. | Latitude. | Longitude. | Specific Gravity. | Current Direction and Rate in 24 Hours. | Surface Temperature | Remarks |
|---|---|---|---|---|---|---|
| 1860. Sept. 14 | ° ′ 40 58 S. | ° ′ 50 00 E. | 1·027 | ° m. S. 76 E. 25 | ° 44·5 | This was at 6 A.M., having fallen 17° since 8 P.M. of the evening before, with so confused a sea that we had rolled a main top-gallant mast away; by 9 A.M. it was 54·5°; and at 3 P.M. on the 15th it was 47·5°. |
| 1861. Aug. 31 | 40 02 S. | 52 35 E. | 1·0275 | E. 64 | 45·8 | The day before the sea was 59·5°, and the day after 52·5°. |
| 1862. Sept. 9 | 41 24 S. | 41 00 E. | 1·0275 | N. 55 W. 9 | 44 | After running about 300 miles to the eastward the sea was 56°; and after 90 miles more to the eastward it was down to 44° again. |
| 1863. Aug. 31 | 40 15 S. | 43 40 E. | 1·0265 | N. 75½ E. 10 | 46·2 | At 8 P.M. of the 30th, only 100 miles further W., it was 61°; and at 8 P.M. of the 31st, about 100 miles further E., it was 60°, and a heavy N.W. gale blowing. |
| 1864. Sept. 11 | 42 50 S. | 47 50 E. | 1·027 | Easterly. | 40 | The sea had been below 50°, from 32° 16′ E long., with foggy weather; on the 12th at 3 P.M. it was up to 58°. In this cold water we had a current of a mile an hour to the eastward |

Mr. Towson quotes the log of Captain Newland, of the *Champion of the Seas,* to prove "that the thermometer not only indicates

the approach towards ice, but also the amount of ice we may expect to meet with. In lat. 58° 30′ S. he passed two icebergs, the temperature of the water being 44°, and that of the air 42°." Now, this passage, in connexion with the above table, shows that we in 42° 36′ S. lat. and 50° E. long. had water 4° colder than the *Champion of the Seas*, nearly 1000 miles further south, and she actually passing two icebergs at the time. It will be noticed that when in 50° E. long. the further south the colder the water, and probably ice was very near us.

In giving the data of this cold patch as extracted from the logs, I would call special attention to the remarks made with each day, where it will be seen that a jump of 18° was made in the temperature between the 11th and 12th of September, 1864, and that this contest between the hot and cold water caused such a sea that we once rolled a top-gallant mast away. On September 3rd, 1862, the following remark was made:—"Sea green and confused; the surface-temperature has risen from 50·5° to 65·3°, and thence the confused weather; wind at one time light, and then a heavy gale; obliged to carry sail to keep ahead of the sea."

Again, referring to Towson's chart and pamphlet, he tells us that about the meridian of Greenwich the ice comes down from 15° W. long. and 40° S. lat., travelling in a south-easterly direction; and adds, "I have been unable to determine whether it again changes its course to E. by N., or returns by a vortical current to the neighbourhood of the Horn." Still, his chart gives a large number of icebergs seen about the Marion and Crozet Islands. Is it not, then, reasonable to suppose that the north-easterly course of the icebergs which came round the Horn is checked by the immense body of warm water which comes down the Mosambique? This warm water, after rushing south-west along the Agulhas Bank, recurves to the eastward, as is proved by the easterly current which we experience in 40° S. lat. This is analogous to the Gulf Stream in the northern hemisphere, and is no doubt caused partly by the decrease in the diameters of the parallels of latitude as the water travels south, just reversing the origin of the easting in our trade winds. Again, this warm water meets the ice-bearing current travelling to the eastward, causes it to come to a standstill, and eventually they both go to the eastward, pressing as it were upon each other, one prevailing at one time, and the other at another, until they arrive in 50° E. long., where we meet with the cold patch. In this position the source of the warm water being left to the westward, the cold current gets the upper hand; so much so that about the middle of September even up to 30° S. lat. we have colder water in the Indian Ocean than in the same latitude in the Atlantic about the middle of August. Now, September is a warmer month than August in the southern hemisphere, and generally the At-

lantic is a few degrees colder than the Indian Ocean in the same latitude, but not so in this case; for instance:—

Middle of August in 30° s. lat. and 25° w. long., the surface-water 64°.
Middle of September in 30° s. lat. and 79° E. long., the surface-water 61°.

It seems, then, most probable that if it were not for the rush of warm water from the Indian Ocean down the Mosambique Channel, the large masses of ice which are known to travel to the north-eastward, and to come so near the Cape of Good Hope, would travel further on the same course, and render the passage round that Cape much more dangerous than it is. Further, there seems reason to suppose that this ice-bearing current divides into two, part of it supplying the remarkably cold water which is found in Table Bay, and then running north, forms an equatorial current of so low a temperature as 70°, the other part carrying the ice which Towson finds crossing the meridian of Greenwich in a south-easterly direction. This ice is most probably fended off by the cushion of warm water, and being obliged to work round its southern edge, travels to the north-east again, forming another curve east of the Cape of Good Hope, like that which Towson gives east of Cape Horn. But thanks to the influence of the warm water with which it is in contact, much is wasted away before it gets north of the Crozets; still, Towson gives several icebergs on that spot, and I have once met them there myself, while the very cold water which we *always* find there shows that something of the kind must happen. If the ice does incline to the north after dipping to the southward round the warm water off the Cape, it supports Towson's theory, that there is as much ice to be met with in lower latitudes as in 51° s. lat. So that 52° is the best latitude to choose as the southern limit for going to Australia.

In considering the subject of the best track for the outward voyage, Mr. Towson remarks on the loss of the *Guiding Star*, with all hands, on a large berg in the part of the sea marked dangerous for ice on his chart, and through which his composite route runs, adding, "Under these circumstances I have hesitated whether it might not have been desirable to modify the outward composite track now generally adopted, by delaying to cross the fortieth parallel till the longitude of 10° E. is attained. . . . . We do not at present feel ourselves called upon to press this alteration." Now, I cannot help thinking that the alteration he hints at would be a very good one, as the winds and currents in this part are generally favourable, and there would certainly be less risk of running upon ice.

Before leaving this subject, I would suggest that as the sea *on* the Agulhas Bank is always several degrees colder than that to the eastward of it, the thermometer is a very good guide to tell a ship when she is coming near the land.

## XIII.—*Notes on two Expeditions up the River Rovuma, East Africa.* By JOHN KIRK, Esq., M.D., F.R.G.S.

Read, May 8, 1865.

As a path by which to trade with the interior, or further to explore the unknown regions of Central Africa, none better than the Zambesi is to be found on the eastern side of the continent. For although the main river is broken by rapids at a distance of 300 miles from the coast, its tributary, the Shiré, leads direct to the southern end of the Nyassa Lake, from which it flows as a navigable river all the way, except one short space, where the waters descend from the level of the lake to that of the ocean. Alone this inland sea is sufficiently large to be of primary importance in the future progress of the country, and it derives further interest as being one of a chain of great lakes which occupy the central regions.

The only objection to the Zambesi is that its mouth is exclusively in the power of the Portuguese, who prevent other nations from ascending, while they themselves pay tribute to each petty negro chief on its banks. It was a great object, therefore, with the leader of the late Zambesi expedition to discover some other practicable route to the great lake. If another path could be found further north and beyond the Portuguse claims, it would in the mean time have certain advantages; and as the Rovuma was said to come from near the north end of the Nyassa, it was determined to explore it with a view to ascertain its size and capabilities.

The steam-vessel *Pioneer* was on the coast, at the disposal of Dr. Livingstone. She had successfully come round the Cape of Good Hope, steamed well, but drew 5 feet of water. In her we left the Zambesi, and passing among the Comoro Islands, to avoid the strong current which sweeps down the Mozambique Channel, stood over for the African coast. On the 21st February, 1861, low coral-islands south of Cape Delgado were seen clothed with bush and trees. Some of these islands are peopled, although in many water is scarce. While we sailed northward the highlands of the continent were distinctly seen as a long range, distant not many miles inland, and promising, therefore, a healthier climate than is found on the Zambesi, where vast alluvial plains intervene between the elevated country and the sea.

Cape Delgado, although not high, is a good landmark. On it there once stood a fort, now ruined; here ends the nominal jurisdiction of the Portuguese. A line of *Pistia*, *Azolla*, and other species of waterweed, through which we passed as we entered the bay, showed that some large stream poured down its flood from the interior, as was also seen in the muddy colour of the water.

As we steamed into the bay the mouths of several small creeks were passed before the main river opened, showing the first ridge or highland through a long vista of mangroves. This slope seemed to be 8 miles off and 200 feet high; in it was a gap, by which the river passed to the alluvial plain. While we lay here at anchor, so strong was the current setting out that our vessel hardly swung to the tide. Off the Zambesi a heavy surf would have lain before us; but here a boat might pass in and out without danger, unless during the strong ebb, when the waters of the river, pent up by the tide, came out with violence, causing a heavy overfall. On either side we had the white sandy beach, backed with evergreen shrubs and a dark wall of mangrove, lining the mud-creeks which lie parallel with the coast.

While some of our party were engaged in wood-cutting, and others in mapping, I wandered along the shore, gleaning first impressions of the vegetation, which strongly resembled that of the Zambesi, except that here, from the proximity of the highlands, many plants came to the seacoast, which before I had known only in the interior. But even the first search was rewarded by many additions to the flora and fauna of Africa, among which a scarlet Combretum and a gay Loranthus were conspicuous at a distance—the latter with its flowers forming a drooping terminal spike.

The loose sand of the coast above tide-mark is here bound together by many grasses and sedges, or carpeted with a dense mat of *Ipomea pes capræ*, *Canavalea obtusifolia*, and *Cassytha*. The crest of this sandy ridge is covered with a bushy vegetation of *Strychnos spinosa*, whose bitter poisonous seeds are imbedded in an agreeable acid pulp; *Flacourtia* bush, whose black plums, when fully ripe, are also edible; the scarlet plum, a species of *Garcinia*, one of the best of African wild fruits, has a habit much like the cypress of northern climes; and many others, among which the commonest are *Oncoba spinosa*, *Colubrina asiatica*, *Guilandina bonduc*, *Hibiscus tiliaceus*, *Thespesia populnea*, *Rhus*, and *Toddalea*—the two last valued by the negroes for the acrid resinous juice, which forms a native medicine.

Within the sandy ridge and its mantle of evergreen shrubs we descend to a mud-flat, covered every tide with water from the creeks, which run parallel with the coast. To enable them to inhabit this soft saline soil trees have roots specially fitted to support them, and seeds to germinate and quickly take root. Here begin the dark, gloomy, and damp mangrove-forests, loaded with malaria and swarming with mosquitoes, where the sun seldom pierces through the leaves above, and a deathlike stillness prevails, broken only by the wild scream of some fish-eagle or the chatter of the monkey. This mangrove-forest includes trees of widely different botanical affinities, but all suited for their

peculiar situation, and admirably adapted to consolidate and favour the deposit of alluvial matter. To their agency is due the consolidation of the great deltas and rich coastlands of the tropics, which would otherwise have been carried off by ocean currents.

In *Rhizophora mucronata*, a system of arched elevated roots forms a platform above the mud, from the branches others fall down to assist in supporting the tree in any direction. This species of mangrove forms a tree of no great size, found in soft mud near the margin of the creeks; its seeds germinate while on the tree, and form a long conical bolt, admirably adapted to implant itself in the soft soil.

*Ceriops mossambicensis* and *Bruguiera gymnorhiza* are others of the mangrove tribe, formed to grow in harder soil. The former is a small tree or bush, the latter a tall straight-stemmed tree, yielding excellent timber, and covering vast regions on this coast. In its shade nothing grows; but the soft tenacious mud beneath is bored with the retreats of many crustacea. In both these trees the roots are clustered round the base of the stem a little above the ground; they then extend far in a horizontal direction, rising in sharp elbows, from which many rootlets go off, to fix them more securely.

*Avicennia officinalis*, although not of the botanical family of mangroves, occupies the softest and most humid places, and is the first species to spring up and occupy a saline marsh. From a strong descending central root many others radiate horizontally at different levels beneath the surface, giving up every few inches ascending suckers, which rise above the soil for several inches, and without becoming new trees seem to be in some way necessary to the plant's growth. In addition to the above there are several others which flourish in these regions, as *Xylocarpus granatum*, whose large globular fruit splits in many segments on falling: its trunk is anchored not by aerial roots or underground shoots, but by sinuous deep plates, which wind through the mud. *Lumnitzera*, *Sonneratia*, and *Stravadium*, are others, the last yields a strong bark, from which the natives construct a coarse cloth, far inferior in strength, however, to the cordage made from *Hibiscus tiliaceus*.

Where these forests are exposed to the air and light, on the banks of an open river or the confines of the grassy plains, they are festooned by climbing-plants, which form an impenetrable wall of tangled vegetation. Of these the India-rubber vine, *Carpodinus*, is one of the most important. The juice of this shrub coagulates immediately on being removed, and forms caputchouc of excellent quality, with little labour. *Dirris uliginosa* yields the native fish-poison. The stems of this, beaten between two sticks, are thrown into a creek or pool, when the fish come to the surface intoxicated.

Many are the species of *Mucuna*, with pods clothed with glassy little hairs, which enter the skin and cause much annoyance. *Pharbitis nil* clothes the creeks with its gay flowers, which continue throughout the year. Within tide-mark the tree-trunks are coated with shells, such as *Cerithidia* and *Littornia;* and on the coast the Cowrie-shell is obtained and shipped off to become money for those of the west coast and Asia. On the sand there are many active *Cicindelas;* in the bushy vegetation large dragon-flies, tree-frogs and snakes.

The pools of water are full of fish and crustacea; altogether to the naturalist, even on the sea-coast, there is a rich field for investigation, of which as yet we know very little, few zoologists having examined the tropical shores of East Africa.

While we lay at anchor many native vessels passed northwards, showing that between the Arab towns and villages a considerable trade goes on. Unfortunately much of this is in slaves, for the markets of Arabia and Persia—a traffic which now equals that to the West Indies, although under the power of the British Government, by which it is tacitly allowed to go on.

On the 11th March, 1861, we steamed up the Rovuma in the *Pioneer*, a vessel drawing, as has been said before, 5 feet of water—far too large a draught for any African river except the Niger. We were accompanied by Captain Oldfield and several officers of H.M.S. *Lyra*. Eight miles inland we left the flat maritime plain and entered the valley, with gentle slopes, on either side rising 200 feet, and leading to what seemed a level plateau. This being the flood season with rivers south of the Equator the river-bed, more than half a mile wide, was filled, and the current powerful; but although sandbanks existed, no difficulty was found in keeping the deep channel. Already the maritime vegetation of mangrove had been left, and a country abounding in fine timber entered. Conspicuous among the trees were the *Cordyla africana*, *Afzelia*, *Lonchocarpus*, and *Dalbergia*, all valuable woods; but others of great size, less known to us, now appeared, such as the *Trachylobium*, or gum-copal tree, a new *Voangueira*, or African medlar. Here and there the *Borassus flabelliformis* raised its lofty head, showing the singularly dilated trunk; but of all palms the *Hyphaene coriacea*, as seen here, is the most singular, its stem dividing many times, and each branch ending in a crown of fan-shaped leaves. Some of these strange trees were seen to branch dichotomously four times and rise to the height of 30 feet, giving an effect to the landscape seen in no other country.

Sixteen miles from the bay the valley slopes came quite to the water's-edge. They were of quartz-pebbles cemented together with sand and a little calcareous matter, or of a coarse sandstone, soft and friable when moist, hardening under exposure. This rock

formation, of which the coast table-land chiefly consists, is probably of tertiary date, and continues with the incrustation which lines the continent at Mozambique as nummulite limestone, or at the Zambesi as calcareous tufa.

The further north we go the thicker this bed becomes, until in Egypt it forms a mountain mass. When this was deposited the whole of Northern Africa seems to have been depressed, and a considerable part of it under the ocean. From the interior and southern regions tertiary strata of marine origin seems to be absent, and represented by fresh-water lacustrine deposits.

Here and there a cleared space in the forest or solitary hamlet showed the existence of a miserable population; but the large amount of bush-country indicates that at no very remote time cultivation was far more extensive than now, for even in Africa forest-trees are slow of growth, and once cut down, require time to be replaced. A gap in the north bank leads to a small lake named "Chidia," surrounded on all sides by an amphitheatre formed out of the plateau. At first we imagined that this might lead to the Lindi, or some other stream to the north, and that the Rovuma would therefore increase in size as we advanced, for even now we began to find difficulty among the sandbanks; but the natives assured us that this lake ended not far off, and, as we could see, it communicated with the river only by flooding the fields, which would soon be dry when the rains ceased.

It now became necessary to send the boats out in order to find a passage for the vessel, whose progress had become very slow and uncertain. But, soon after, we decided to return, as a sufficient distance had not been gained to serve as a starting-point from which to reach the lake by land, and the natives had showed themselves far from favourable, and ready, if an opportunity offered, to annoy us.

The few hours we remained were occupied on shore collecting natural products, which it had been impossible to do while steaming rapidly along. The season was favourable for the purpose, although many of the more delicate herbaceous flowers had passed, and given way before the tropical grasses, which were now rushing into seed before being dried up and burned. About one-third of the plants were unknown on the Zambesi, and many proved new to science. A handsome new *Tetracera* represented an order known to exist in Western Africa, but hitherto not found on the east coast, while a third species was added to a small genus hitherto peculiar to the Indian flora; but of African genera, to which additions may be made from this region, the number is immense, and except the mountains of the interior there is no part richer than this as a field for a botanist. The mantling creepers which clothed the forest-trees indicated a climate

perhaps rather more humid than that of the Zambesi: but as we were limited to the vicinity of the river, and near the coast, it is impossible to draw accurate conclusions in this respect, while the thermometer shewed no change either in temperature or humidity. Yet it is very probable that the rainy season, if not more extended, may be here more copious. The valley slopes, where free of trees, abounded with grasses of the genera *Setarea*, *Sorghum* and *Andropogon*, and on the pools of water floated the white and blue flowers of the water-lily, both *lotus* and *stellaris*.

Wild animals, of which traces were seen, included the hippopotamus, elephant, buffalo, water-buck, black buck, bush-buck, and smaller antelopes; also hares, porcupines, baboons, and monkeys.

The few natives met with were timid, and overawed by half-caste Arabs of the coast. On 16th of March the river continued falling, and on the 18th we began to descend, but did not reach the coast before the 23rd, having been many times fast aground, and more indebted to a sudden rise of water than our own exertions for getting off; indeed, had the water continued falling, it may be doubted whether the vessel could have been taken down without being first lightened of her cargo.

On the 29th, having wooded from the mangrove-forest alongside, we left the Rovuma for Johanna, there to take in provisions, and assist the missionary party, under Bishop Mackenzie, in settling on the Zambesi.

Remittent fever now broke out as an epidemic, and prostrated all who had not before, by long residence on the Zambesi, become accustomed to the exhalations of unhealthy regions; so that while crossing to the Comoro Islands the vessel was in the hands of those who did not profess acquaintance with navigation.

Quinine, which elsewhere has been so much praised as a safeguard against fever, when taken in small doses daily, has been found by us quite inert, attacks of fever coming on those who have never before been exposed while using the prophylactic and under its physiological influence. Yet, in the cure, quinine is indispensable; nor do I think the glass of wine in which it is often administered to seamen before going on shore in these parts at all without its value; although a cup of hot coffee has always seemed to me much better than quinine wine. To keep off fever the great essential is that both mind and body should be kept in active exercise; and nothing is a surer sign of a European being unfitted for the climate than to see him languid and incapacitated for action. At first, on landing, everyone must expect an attack, which passes off. Yet the climate of East Africa is quite unfit for a European residence, beyond a limited number of years, for soon the health is undermined.

The Rovuma was a second time examined by us in boats during

the dry season of 1862. While the *Pioneer* was left at anchor in the bay, our two boats, in charge of Dr. Livingstone and myself respectively, ascended as far as the rapids, where all further progress is stopped.

On starting for the voyage our party made an imposing figure, being accompanied for two days by Capt. A. Gardner, of H.M.S. *Orestes*, then in the bay.

On first entering the river the first thing to strike us was the great change in the volume of water coming down. Now, instead of the deep channel, full from side to side, there was only a narrow streamlet, at first confined to the right bank, and at a mile or two crossing between banks and shallows. So difficult, indeed, was the navigation, and so bad the passage, that the cutter of the *Orestes* was forced up the first 16 miles with the greatest labour. In order to advance a mile it was necessary to cross and recross from bank to bank, while the many turnings deprived us in great measure of the use of sails. On the afternoon of the 10th we camped on a wide sandbank opposite Lake Chidia, and ascended the slope while dinner was prepared by the seamen. This was now the driest time of year, while the air was intensely hot, and the sky unclouded. The only green trees still in leaf were the *Trichilias*, *Afzelias*, and *Tamarinds*, hung with climbing *Dalbergias* and *Cursneas*, which lined the river-bank at the foot of the slope. Everything beyond was parched, withered, and ready for burning; the trees leafless, like those of Europe in winter, here caused by the heat and drought, there by the cold. It was, therefore, the worst time of year for the botanist, as only a few withered capsules remained. Having reached the summit of the ridge which cut off the lake, we descended the opposite slope to the wall of papyrus and reeds which lined its banks. On the ground passed we found many pieces of fossil wood converted into dense silica, such as we see in many parts of Africa, from the desert of Suez to the Zambesi. The rock was everywhere a loose conglomerate or coarse sandstone, and probably of tertiary date. No rocks like the old sandstone of the Zambesi were here met with. Much of the wood through which we passed was *Dalbergia melanoxylon*, a fine compact sort of ebony, of considerable value when sound, but unfortunately liable to cracks and rotten holes. On these trees there hung abundance of the litmus-yielding lichen, or *Orchella*, which is still an article of export by the French. But here we met the Tsetse fly (*Glossina morsitans*), in itself curse enough to keep civilisation from a country, for with it neither the horse, ox, dog, nor sheep can live, its bite being fatal to all animals useful to man, except the ass, goat, and mule; and the only hope yet known of clearing a country so infested is in the extermination by gunpowder of the elephant and buffalo, on which it depends, yet

which in their migrations it does not always follow. The few natives inhabiting the few rude huts had nothing to sell beyond a few pumpkins and a little honey, for which high prices in cloth were demanded.

On the 11th our friends took leave of us, and returned to the bay, while our two boats pushed on, determined to follow the stream while it remained possible to force the boats along. We had already seen enough to convince every one that the Rovuma is of no value for trade with the interior. During the dry season it is not navigable to boats, for while we succeeded in urging our own forwards, the process could not be called navigation. During flood, too, we already knew that the stream could not enable to pass such a vessel as the *Pioneer*. Still, it was an interesting geographical problem, and might one day serve as a path for explorers while the Zambesi remained closed.

The main bed of the Rovuma was found to take a very direct course, with slopes increasing in height as we advanced, and distant one or two miles from the bank.

On the 14th, while we camped under the shade of a *Prosopis* tree, several natives came to us from a village a little distance off, bringing pumpkins and cassava-root. From the prosopis tree the best canoes are made, being strong and durable, undergoing much rough usage among rocks without damage.

On the 15th we had to retrace our course a little way, having got on the wrong side of the banks. In the afternoon of the same day we came to an archipelago of low sand islands, with a few reeds in the middle of each; and here the difficulties increased, but our crew, which included Zambesi natives, by long training could usually distinguish the proper course.

On the evening on the 16th we came to the first considerable settlement of natives met with since entering the river. The huts were large, with conical grass-thatched roofs, rounded at the top, and well placed under the shade of a dense clump of fine trees, half a mile from the water-edge.

The river-bank where we lay was about 12 feet high, of stratified clay, with a few calcareous nodules and marsh shells in its upper beds. Hither the natives brought for sale a little rice, corn, and vegetables. They were a wild people, speaking a harsh discordant language, in which we could trace some resemblance to that of the Zambesi, from which it differed so as to be quite unintelligible to the natives who accompanied us, of whom some could speak the Makoa and Ajawa dialects. The men were rather tall and sinewy, of dark complexion, and forbidding expression. The little cloth possessed by them was entirely of foreign manufacture; while the women, hideous in the extreme, wore nothing but a sheet of bark round the loins and a few beads or rings on the neck and

wrists. The practice of piercing the upper lip, and inserting in the hole, which is slowly dilated, a ring of ivory or piece of stone, named the *pelele*, is here practised by the females. Arrows of rude manufacture, with lozenge-shaped iron tips, were commonly carried, and the bow differed from that of the lake tribes in having one horn projecting for a foot beyond the attachment of the string. Several carried firearms, but the shield, spear, and club seemed unknown. None of the weapons seen on the Rovuma were poisoned; but as we advanced further up, arrow-heads of exquisite manufacture were found, showing a much higher state of the arts.

The district in which we now were seemed to be named Kokojamana, and the people the Makonde. In the crowd gathered on the shore there was one man of finer make than the others—tall and clean, with a piece of new cloth round the loins; he carried a well-kept old Tower musket, and had the singular fancy of wearing a large lip-ring, a habit adopted by the women of many tribes throughout tropical Africa, but before unknown to us among the men. Yet this was no personal fancy of his, as we afterwards learned; it is universal among the Mabiha, a small tribe who live among the hills to the south of the river bordering the Makoa, to whom he belonged.

On the 17th of September we got under way at 6 A.M.; the air was then 68° and the water of the river 75°. The day was sultry, with puffs of wind stirring more or less up the river: a thick haze clouded the landscape and prevented a distant prospect, while columns of ashes and dust, raised by whirlwinds, stalked over the plains. Such days at this season are frequent during the hot months which precede the rains. In the forenoon we came to a large native settlement of the Makonde: it consisted of ill-constructed huts, hastily thrown up, of reeds and coarse grass, and was built on one of the flat sandbanks in the middle of the river, which had been left dry by the falling water, but which the first floods would again cover.

Here were gathered together a multitude of men and women, destitute of any store of grain or flocks of goats, yet seeming in good condition. They expressed a particular desire that we should land; but their manner was so rude as they crowded round the boats, each man with arms in his hand, that we saw no inducement to do so, as they had nothing to sell, notwithstanding their promise of a goat. Whether they were out hunting their neighbours, or fleeing from enemies while their food remained stored in the bush, we did not learn; but probably their mode of life included both proceedings, and while afraid of being pounced upon by others, they are ready themselves to seize and sell any who came within their power. While some of our men picked up drift-wood, with which to cook a meal, they noticed in the village

two recently-decapitated human heads. This district is named *Njare*. In front the southern ridge of hills recedes, leaving a wide valley, which we now entered, and for the first time the monotonous landscape was broken by a few low rounded hills, standing alone in the plain.

In the afternoon we sailed through a desolate region without meeting canoe or passer-by, so little intercourse exists here between neighbouring villages. We came at sunset to a camp, similar in all respects to that we had passed; nor had the people received the least warning of our approach, as would have been the case elsewhere in a country where confidence exists among the people. Here one horde seems to prey upon the other, and cares nothing for its neighbours, the scattered villages being probably incapable of uniting when threatened by a common enemy. While cooking supper before going to bed, several bits of coal were picked up on the sand: they were rounded and waterworn, as if carried by the stream from a distance, showing the existence of this mineral in the interior—a fact which may one day be of importance. At present and for many generations to come it is to be feared that neither coal nor iron will repay the carriage from so difficult a region. On the Zambesi, where both iron and coal are equally common, there is more hope of a future trade in them.

On the 18th we met with greater difficulties than we had yet encountered, and were obliged to force the boat through a wide expanse of sand, with only a few inches of water to cover it, by the assistance of the natives from the settlements on these sandbanks, which were here numerous. Although working hard the whole day, we did not gain 5 miles, and fully half of this had been in deep water under a high claybank, covered with stout Borassus fan-palms, whose leaves rattled overhead as we sailed along.

The natives who had helped us came to sell tobacco in the evening, which they did at most reasonable prices; nor was the quality at all bad: 12 lbs. were obtained for a yard of unbleached calico. In preparing tobacco here, the leaf, being picked from the plant, is tied up in straw and for a few days allowed to ferment, when it is pounded in a mortar and moulded, not unlike a flowerpot with a hole passing through the centre made by the stick which supports it, to dry—an operation allowed to take place slowly in the shade. Exposure to the sun and the constant glare of the sun on the water, which throughout the whole day I had to look on while steering, had caused a deep-seated inflammation of the eyes, which dimmed vision and caused much pain.

Next morning the natives returned, anxious ostensibly to sell tobacco and gum copal, which they dig from the river plain, 100 miles from the coast. Their being armed excited no suspicion beyond what we entertained for all whom we had met with in

the Rovuma. As we sailed along they followed for several miles, and made at one point a rush to gain a prominent point where the current ran strong and the river was narrowed between sandbanks to only a few boats' length. In this they failed, for a strong puff of wind took us quickly past. Then a shot fired to kill a puff-adder basking in the sun caused great commotion among them, and they rushed off to the forest; but we had not gone half a mile when the stream again ran close by a high perpendicular sandbank, clothed above with tall grass, which the nature of the water forced us to approach within 50 yards. Here the leading boat, which I commanded, was fired on without warning, and insulted in the grossest manner. As none of us were hit, although arrows passed on all sides of the boat, I merely waited for the arrival of the other boat, and pulled off as far as the water would allow. A long parley ensued, after which the people professed to have mistaken our intentions, and so attacked us; but they were a discordant rabble, without any head man, and it was too evident that nothing but plunder had been meant. Frustrated in their first attempt through their own bad shooting, we had thus full time to be ready for any further treachery. However they professed to be fully satisfied, and we then went on; but no sooner had we neared the bank than a second volley of arrows fell round about us, and five bullets passed through the sail of one of the boats. At this the natives retired, so that none of those implicated were visible, while others, at 200 yards off, deeming themselves safe, still appeared. The first two shots fired by us killed a couple of them, whereafter we passed unmolested, and again found ourselves in a desolate region.

On the evening of the 20th we were at a village of the Makoa, on the north side of the Rovuma. Here our men could converse freely, knowing well the language. The name of this place is *Michi*. Here the two ridges, which had all along remained in view, ceased. Before us lay a gently rising plain, studded with clumps of shady trees and hills of trap or igneous rocks, while in the distance we saw mountains of no great height, looking more metamorphic in their nature.

Although not using the horseshoe mark on the brow of the ordinary Makoa near Mozambique, the people here spoke the Makoa language perfectly, and knew well Ibo and Mozambique, with which they traded, and where they had seen English ships of war. We found in the neighbourhood an Arab of the coast on his way back from the lake with ivory and slaves: he spoke to us freely of the route, and knew the ferries which we had visited. From him we learned that after crossing from *Tsenga*, on the western shore of Nyassa, where we had been, to *Nombo*, the path lay over the mountain, through the territory of the Wakó or Ajawa people, until the course of the Liende, or Niende as it is also named, is

met with. This stream rises in a small mountain lakelet in the hills which overhang the Nyassa, and flowing north-east, joins the Rovuma at Ngomano, the residence of one Donde, ten days' distance west from where we now were. At this point all coast caravans cross the Rovuma, and passing by Michi, there leave the Rovuma and keep to the north-east, avoiding the Makonde, who are known as treacherous robbers. The Niende is said in its lower course to be shallow and free of rocks, which would lead us to believe that the mountains which shut in the Nyassa are here distant from the coast and steep on their eastern slope. Of the Rovuma we obtained but little reliable information, as none professed to have travelled far up it. They said that it was believed to flow from Nyassa and to be full of great rapids and falls. Here white and blue cloths were in demand. The native industry of weaving from the good staple cotton which grew seemed not to be practised.

It was curious here to find the swordfish inhabiting a fresh-water river far from the sea; but the same fact had been before observed at Tete, on the Zambesi. Indeed this species, *Pristis perotettii*, is certainly a native both of salt and fresh waters, although I have never known it to occur above the rapids.

23rd. We had passed the previous day through a country more thickly peopled than formerly, and were again among the Makonde; but this portion of the tribe proved civil: on approaching us their arms were left behind. The country was more rugged, and the plain dotted with eruptive trap rocks and the river-bed sometimes with rocks and gravel. The baobab was now coming in flower. This is one of the trees which anticipate the rains, taking on life while others are dead, and while no change in the humidity of the air has been indicated by the hygrometer.

In the forest near the river we had before seen many bark-hives placed in trees to attract the wild bees. This is an industry which would well reward the natives, requiring the least possible labour and yielding a substance of high value, always in demand; but as yet it has not been developed, and these hives are placed more for the honey than the wax, which seems to be thrown away—at least none was ever offered to us for sale. Unprincipled as are the people of this region, it seems that a bit of rag or a vegetable rope tied round the trunk of the tree on which the hive is placed is quite sufficient to deter robbers, from dread of magic and witchcraft. Half a mile from the river to the south of our evening camp was a bluff cliff of black trap, with perpendicular face, named Lukombe, a good landmark in this part.

On the 24th we still passed native camps on the sandbanks. The people in them seem perfectly idle, living on the harvest of last season, which they have concealed in the forest and among the

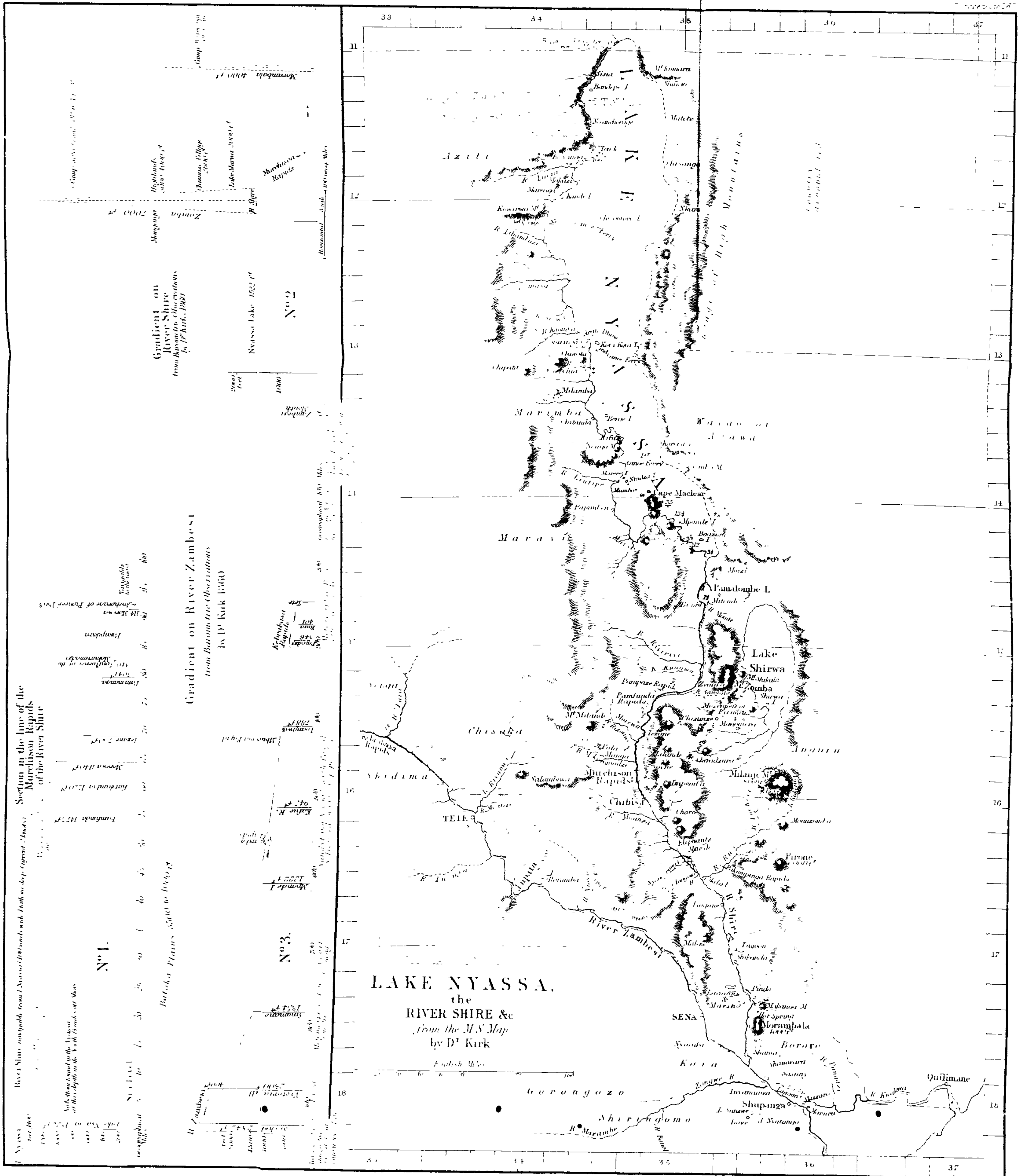
rocks. In the evening we reached two rocky hills, which closed the river, and it was a relief to escape from the monotony of endless sandbanks. In a thicket of tangled jungle, where we camped, there was a corn-safe full of grain: it was made of split bamboo, platted and supported on uprights, while a thatched roof covered it to keep out the wet.

On the 25th we passed a high, rocky, well-wooded island, in the middle of the stream, which now began to flow more swiftly over stratified metamorphic rocks. Canoes passed us on their way to Ngomano to trade in salt; they are small and narrow, and are taken by water all the way, but between rocks so close together, that all declared our boat could not get through. And so we found it the following day, for the river crossing a rocky bed of boulders does not leave even a boat-passage. The banks were now of stratified schists, with large crystals of felspar.

When we came in sight of the rocky bed above mentioned, it was at once seen that our furthest point by water had been reached. We had attained a distance of 120 miles from the ocean. No lofty hills, such as are believed to lie along the eastern borders of Lake Nyassa, were yet visible, and natives told us that further up-stream the river divided into two, its southern branch being the Niende, which they knew well, and the other coming from the west, less known and little visited, flowing through ten days' march of unpeopled region, and supposed to rise in the Nyassa Lake.

Near where we camped a large baobab tree, which had rotted at the base and fallen down, drew my attention. The huge trunk still lived on while it lay on the ground, and had begun to throw out granulations, which indicated the annual rings of which its stem was composed. These fully bore out what I had before been led to believe, namely, that the rapid growth of these trees sufficiently accounts for their size, and that even the largest might attain its great dimensions in 500 years.

On the 27th September we began the descent, at first cautiously among dangerous rocks, then more freely along the flat valley. Having expended our stores we now floated lightly, which more than balanced the slight fall of water which had taken place. At the point where we were attacked the people were respectful and civil, showing none of the rudeness they had formerly exhibited: a lesson had been taught them, which had done them much good. One evening we came to a deserted village on the bank, which we had missed when going up. The natives had not long left it, and seemed still to be near. In the centre was the grave of some chief or head man, whose death had caused them to remove. It was surrounded by upright poles, on which a few charms were hung, the ground being slightly raised and covered with blue cloth, pinned tightly down over the earth, and now pierced by mice.


LAKE NYASSA,
the
RIVER SHIRE &c
from the M.S Map
by Dr Kirk
English Miles
Gradient on River Shire
No 2
Gradient on River Zambesi
No 3
No 1
Section in the line of the Murchison Rapids of the River Shire
Cape Maclear
Pamdombe I.
Lake Shirwa
Zomba
Murchison Rapids
Chibisa
TETE
Elephants Marsh
Pirone
Milanje M.
Morambala
SENA
Shupanga
Quilimane
River Zambesi
Gorongozo
Maravi
Marimba
Chisunka
Shidima
Anguru

Pots were placed, mouth downwards, round the spot, and outside the hut food and domestic utensils had been thrown out.

On the 9th October we reached the vessel in the bay, to find all well, having ourselves escaped with little fever, although exposed terribly to the sun.

As a path to the lake the Rovuma had certainly disappointed us. In flood, there was not water enough for our steamer; when low, our boats with difficulty had passed, and we were effectually arrested half way to the lake. If ever a local industry should spring up on its banks, the Rovuma is capable of bringing down the produce during flood, or for three months each year in boats and barges; but that day is distant. It is, however, while the Zambesi remains shut, an easy way by which to pass the hostile and extortionate coast-tribes, and so give a good start for any explorers bound to the unknown regions between the lakes of the interior, and so determine the yet vexed question of the ultimate source whence the Nilotic Lakes receive their supplies of water. Ten days from Ngomano the explorers will be at the northern end of Nyassa, or at least at the most northern point where it is known to reach.

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## XIV.—*Notes on the Gradient of the Zambesi, on the Level of Lake Nyassa, on the Murchison Rapids, and on Lake Shirwa.*

By JOHN KIRK, Esq., M.D., F.R.G.S., F.L.S. [With Diagrams.]

*On the Gradient of the Zambesi.*—The instruments used in determining the level of the Zambesi were the mountain barometer, aneroid barometer, and boiling-point barometer. So long as the first of these continued serviceable its indications must supersede the others. Fortunately it did not break down until we had passed 600 miles inland and a level on the Zambesi of 1222 feet. Here we left the river and ascended the Batoka hills: before doing this careful comparisons of all the instruments were made, and thus a point determined which on our return became available for checking any additional instrumental error. It was then found that the aneroid still continued adding at a steady rate to its originally *plus* error.

At low levels observations of the boiling-point of water proved of no use, but observations made with this instrument agreed very closely with the results of barometric heights at higher elevations: thus the results by both place the Victoria Falls at almost the same height above the sea, while the lower stations of Zumbo, &c., discord considerably. A similar observation has been made by Dr. Hooker in India.

There is some difficulty in estimating the height of Tete (near the head of the lower navigable portion), distant 300 miles from the sea-coast. In this part the sea-air first comes over land and suffers changes which seem to cause a permanent depression of the barometric column, indicating a greater elevation above the sea-level than in fact exists.

With the windings of the river we may estimate the total length of this part as a little over 400 miles: in addition, the river is shallow and spread over flat sandbanks, causing a great amount of friction, so that, making all allowance for retardation, Tete cannot be over 400 feet, while the barometer would indicate 600.

As we pass further inland it is possible that an error from permanent depression of the mercury still increases; if so, the heights deduced will be too great, but against such a source of error there is no security even in countries further advanced than Africa. The elevation, however, as here given, will be found to be close approximations to the truth. Within the tropics the diurnal barometric wave follows the same course with unfailing regularity, unless during a storm, the difference of one day from another seldom exceeds one-tenth of an inch, and even these small changes are accompanied by a change in the quarter of the wind.

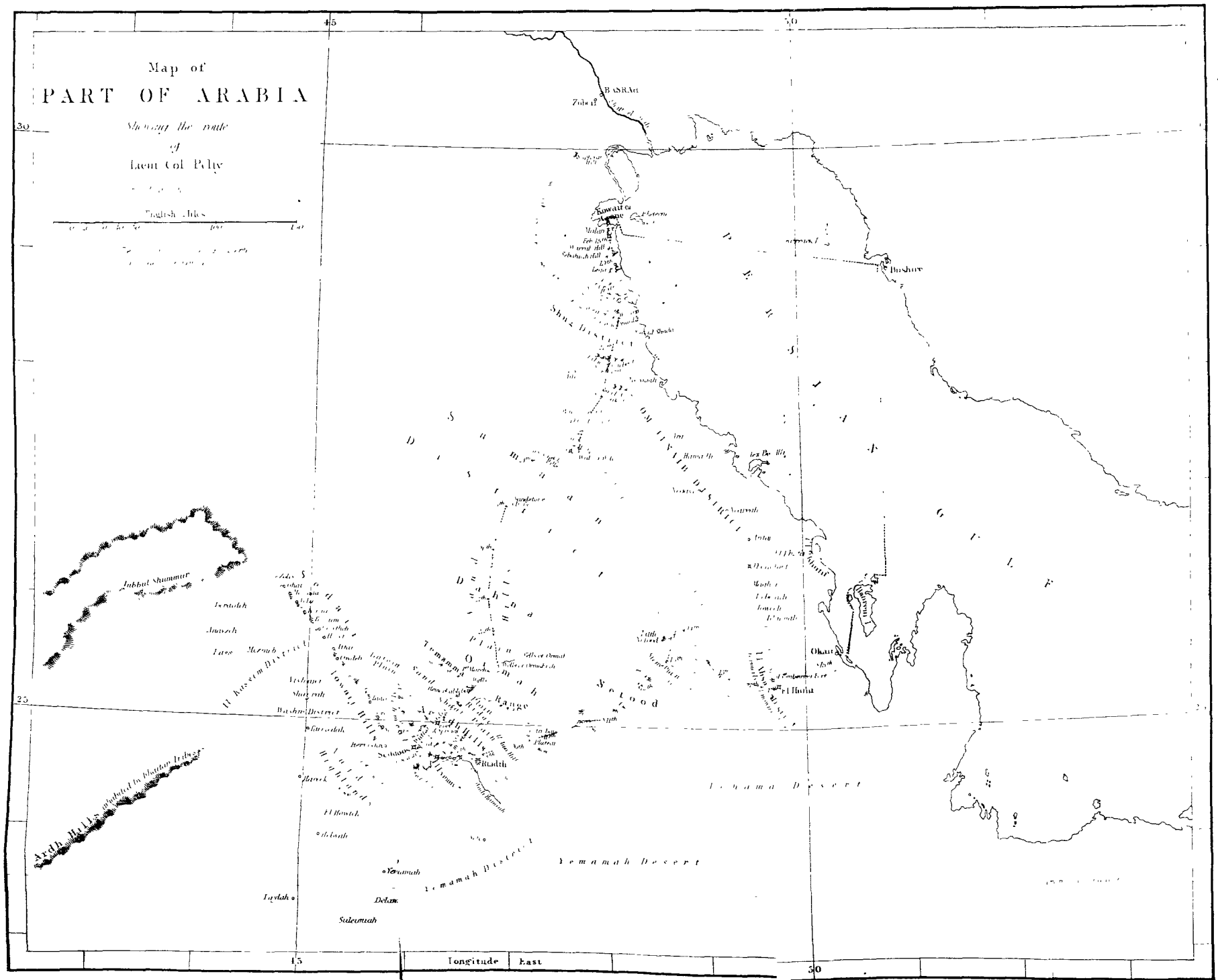
Where a series of observations have been made during the day at one station they have been reduced to the mean at the sea-level by applying a correction for the various hours, which in so steady a climate may with safety be done. This correction is founded on tables from observations in the centre of the continent and on the coast.

*Level of Lake Nyassa.*—In determining the level above the sea of the Nyassa Lake, we have first observations made on the 18th September, 1859, at the time when it was first reached by Europeans. The observations made then were:—

| | Inches. |
|---|---|
| | 28·38 |
| | 28·34 |
| | 28·36 |
| Ind. error .. .. | 0·04 |
| | 28·40 = 1575 feet. |

Mean air temp. 70° above.
„ „ „ 80 below.

When we returned a second time to that lake under Dr. Livingstone, in August and September, 1860, the following observations were made:—


Map of
PART OF ARABIA
Shewing the route
of
Lieut Col Pelly
English Miles
45
50
30
35
15
Longitude East
BASRAH
Zobeir
Koweit
Bushire
Shuaz District
Jebel Shammar
Aarab
Aarab Desert
Tuwaiyim Range
Nefood
Hasa
Okair
El Hasa
Riadh
Yemamah
Yemamah Desert
Dilam
Sulemiah
Aridh Hills
Published for the Journal of the Royal Geographical Society by J. Murray, Albemarle Street, London, 1865.
Edw.d Weller F.R.G.S.

| | Inches. | |
|---|---|---|
| 1st series, from 27th Aug. to 8th Sept., 1860. | | |
| Mean reading of 10 observations, corrected for Ind. error | 28·42 | Air above 70° |
| 2nd series, from 8th Sept. to 20th Oct., 1860. | | |
| „ 8 observations .. .. .. .. | 28 54 | Air above 70° |

Mean of simultaneous readings of standard bar, at foot of Murchison Rapids, corrected and reduced to 32° Fahr. Lat. 16° 2′ s. = 29·932. Air 63°.

1st series = 1543 feet.
2nd series = 1425 „

The 1st series taken on the second occasion I consider the best, and should therefore give it two values in taking the mean of the three sets, which will be 1522 ft.

*Murchison Rapids.*—A series of barometric observations taken during the journey up the Shire to gain the Nyassa, and again corrected on our return by the same route, with a few of the intermediate points checked by observations when first that country was entered by Dr. Livingstone and myself, furnish the accompanying section in which are indicated the chief rapids through which the water of Nyassa descends from its own level, 1522 feet, to nearly that of the ocean.

The rapids have been named after the distinguished President of the Royal Geographical Society, to whose patronage African geography is so deeply indebted.

The levels of the respective rapids are calculated to corresponding observations made on board the *Pioneer*, at anchor in the Shire at their foot, to which 100 feet has been added as the probable difference between that station and the sea-coast.

*Lake Shirwa.*—The water-level of Lake Shirwa, in lat. s. 15° 23′, was ascertained by observation of aneroid barometer when that lake was discovered—the only time when scientific instruments have been taken to its edge.

The barometer, corrected for index errors, showed 27·86 at noon of 18th April, 1859, =2000 feet above sea-level.

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## XV.—*A Visit to the Wahabee Capital, Central Arabia.* By Lieut.-Colonel Lewis Pelly, H.M. Political Resident, Persian Gulf.

*Read*, June 12, 1865.

About a year ago, Mr. Frere, the President of the Geographical Society of Bombay, attracted my attention to the Proceedings issued by the Royal Geographical Society on the 28th of April, 1864, showing that certain questions had been mooted in London relative to the geography of the interior of Arabia, and that it was still a desideratum to determine with scientific accuracy

the position of Riadth, the capital of Nejd, and of Al Hūfūf; and also to observe the physical character of the tract lying between Riadth and the littoral of the Persian Gulf. It so happened, also, that about the same time, I was desirous of a personal interview with the Chief of Nejd, on matters connected with public duty. I determined, therefore, to proceed to Riadth; pursuing one route into the interior, and returning to the coast by a different course. Dr. Colville and Lieut. Dawes, two officers attached to my establishment, volunteered to accompany me; and it is very agreeable to me to acknowledge their subsequent cheerful endurance and valuable aid.

We landed on the Arabian coast, at the port of Kowait, in the north-western angle of the Persian Gulf; passed some time there in making preparations and overcoming little obstacles, and eventually started for Riadth on the 18th of February last. We did not attempt to conceal our nationality; but were known from first to last for what we were. I deemed it prudent, however, to make all the party throw the "Abbah" and "Chiffeeah" of the country over their own clothes, and thus avoid needless intrusion and collision. We moved always on camels, starting a little before daybreak, and continuing our march until sunset. The camels browsed as they went along, and on arrival at our ground were allowed to straggle in search of their scanty evening meal before being herded for the night. I may mention in passing, that it would have proved impracticable to take loaded horses at the required rate over the country to be traversed, while our camels carried ourselves and baggage a distance of between 800 and 900 miles in twenty-six marching days, with only one intervening halt of three clear days. They drank but once during the first ten days; and had I taken the precaution of leading with me a milch camel, it would have been practicable for me to deviate into wholly waterless tracts, trusting entirely to camel's milk; for it is an undoubted fact, that during the spring, when green food is comparatively abundant, both man and horse can thrive on camel's milk alone, without any other sustenance, whether solid or liquid.

After leaving Kowait, we moved the first day to the neighbourhood of a fort named Malah; this is the inland boundary of the little chieftainship of Kowait. Here all trace of a road ends, and you enter the Wahabee territory across boundless and slightly undulating plains. Being spring, the grass and wild flowers were at their best, and just sufficient to give a slight glow of green. A small conical hill, named Warrah, lay to our right front; and a little farther on, the hill called Sebahiah. There was no mark of hut or water, nor from this point onwards until we reached Nejd Proper, did we meet a single fixed human habitation, and only

one tree and one set of permanent wells (to be presently noticed). We had with us the instruments requisite for determining latitude and longitude; also a small tent, or rowtee, which we pitched at night with its entrance towards the north; and when all was quiet, took our position by stellar observation. During the march, Dr. Colville collected such specimens of rocks and flora as he was able to do without attracting attention. I kept also a brief journal descriptive of the day's march, and showing the point whence we started, the point of arrival, the number of hours we were actually on the move, and the general direction. By collating our stellar observations with the dates on which each specimen was collected, and with the several entries in the journal, we were enabled to lay down our route with some degree of detail and accuracy. I may here premise that the changes in the physical character of the country along our route proved to be very marked, and to lie in riband-like lengths generally parallel with the shore-line of the Gulf, and extending over many degrees of latitude. Hence, as we crossed these ribands in a south-westerly direction, on our way from Kowait to the capital, and recrossed them in an easterly direction on our return from the capital to the port of Okair, a little to the southward of the Island of Bahrein, we obtained two series of fixed points for each successive change of country, and were thus enabled to determine the general direction of these changes over considerable areas. I was careful also to collect information as to stages along routes which I did not actually traverse; and I venture to hope that those points, which lay at no very great distance from our line of march, may have been laid down with sufficient accuracy; since, by being in possession of fixed points from which to calculate, and by taking bearings from more than one of these known points, we were enabled to intersect our lines. These intersections we further tested by tabular statements of distance collected from the natives; and I think that the districts, for instance, of Sedair, Bataih, Seh, Al Howteh, &c., may have thus been approximately laid down. I would explain, however, that considerable caution is necessary in estimating distances from native testimony, and this because, firstly, Orientals are painfully inaccurate observers of facts; secondly, because the distances are nearly always given in days' journeys, and a day's journey varies in length with the nature of the country and the requirements of pasturage and water; thirdly, because the name of a chief town is loosely applied to its surrounding district, or *vice versâ*, while the days' journeys are calculated, at pleasure, from town to town, or from district boundary to district boundary; and, fourthly, because many persons exclude from their marching days those on which they start and on which they arrive. I am careful to touch on these details, because some confusion was last

year noticed in this Society in regard to distances in the region of Al Ahsa.

On the 19th we reached an uninhabited halting-ground called Legait. From this point a road branches to our right, towards Zolfy.

On the 20th we crossed a creek named Grain, which leads to the sea, distant one day's journey, and encamped in a district called Warfra. The littoral district of Adan, which is marked on the maps as stretching from Kowait to Khutif, really ends in this day's latitude, or only one day's journey directly south of Kowait; the general name of the entire country along the shore-line from Kowait to Al Ahsa being Om Jenaib.

On the 21st, after crossing a low range of hills called Delaa al Delaa, we came on a semicircle of sulphur hills, known as Delaa el Chebrut. This district is known as Shug, and the line of hills trends northward towards Serphwan, a remarkable hill in the neighbourhood of Zobeir, near Basrah. The strata of Shug are said to follow the curve of the hills which mark the boundaries of the district; and our Selaib guide informed us that sometimes, when they lose their way, the natives dig into the earth, and so ascertain in what district they are from the direction of the soil or strata. There is evidently a gentle rise in the country from the sea.

On the 22nd the character of the country became less regularly undulating, and dotted with low, widely-detached hills, the ground more bare, brushwood decreasing, with spaces thinly sprinkled with shingle. In one or two places sandstone just cropping up level with the soil. The country appeared to ascend inland in a north-westerly direction, and the climate became sensibly colder. Passing out of the district of Shug, we came on a few remarkable sand-mounds, called Redaif, and encamped on the borders of the district of Wurreah.

On the 23rd we passed through Wurreah, which is a sort of threshold to Sumaan, or the stony girdle of Central Arabia; that is to say, the ground of Wurreah becomes gradually broken up into patches strewed with pebbles and mounds of earth and sand-stone until you reach the defined line of Sumaan. This is a region of confused earth-mounds and low flat-topped sandstone hills, with intermediate scourings from the winter rain-water, along broad, winding, flat-bottomed valleys. The hills become higher and more entangled as you proceed. I understand that the Sumaan belt extends in a northerly direction for some eight days' journey, when it loses the name of Sumaan, and is called Hajar, which name it bears until the neighbourhood of Sooke i Shook on the Euphrates. The belt, however, is one and the same, but is called Sumaan along that portion which is composed of friable rock;

while the name Hajar is applied to that portion strewn with large dark-coloured boulders. This Hajar must not be confounded with the name Hejr, an old name for the district of Ahsa, which is skirted on its western side by Sumaan.

On the 24th we halted for some hours at a depression in the Sumaan hills, called Wubra. This, at one season of the year, is a great central Wahabee camping-ground. It contains upwards of a hundred wells within a space of 400 yards square. Only a few of them were in good repair, and with one exception they were all brackish. When the Bedouins assemble here, they clear the adjacent wells, which are dug some three or four fathoms through the solid rock. It is said that they are of very ancient date; and that this Wubra was a point of convergence in ancient days for caravans passing from Kowait across Arabia. From the neighbourhood of the wells, a line of route branches off in the direction of south-west by west towards Majmaa, in Sedair, which is distant six days' journey. I had wished to follow this line with the intention of visiting some inscriptions at Grief, near Jelajel, in Sedair. The poverty of my water-skins, however, and the incertitude of my guide as to his road through the sand-hills, prevented me hazarding a trip which would have kept me at least five days without any fresh supply of water.

We saw the traces of a small hill-fort close to the Wubra Wells. It is said to be very old, but it did not appear so to me. From this point onward, the Sumaan becomes more open, the valleys broader; and the low flat-topped hills are frequently streaked with brick-colour near their bases. In some instances, where the hills are conical, their summits are brick-colour. Among other wild plants, we picked a bulb which the Bedouins eat after peeling off its rind. It reminded me somewhat of a Brazil-nut, both in appearance and in taste. A quantity of sour sorrel grows along these valleys, and is said to have been imported into Arabia from Egypt. It is now commonly eaten by the Bedouins.

On the 26th we finished the Sumaan, whose hills gradually diminished in height until they sunk into gentle undulations of sandstone and sandstone-flakes. Leaving the hills, you cross a gentle glacis of hard pebbly ground, on the further side of which the sand-hills of the Dahna rise with the distinctness and sharpness of outline of a glaring wall. The first sand-ridge may be 100 feet high, and is sprinkled with vegetation. It is a few hundred yards in width, and is succeeded by a plain of some miles broad, beyond which rises a second ridge of sand-hills. The intervening plain is of hard soil; and the ridges themselves seem to overlie elevations of rock or soil. In fact, the natives apply the term Dahna only to that portion of the great sand-belt of Arabia which is thus divided by parallel ridges resembling successive rollers with intervening

plains of sea. To the north and to the south the belt of sand, although equally defined on its exterior limits, is composed of confused sand-hills, and sometimes of pure dunes: it is then called Nefood. At the point where I crossed the Dahna, there are seven distinct ridges, some of them miles in breadth, and none higher than two or three hundred feet above the intervening plains, which in turn vary from five to ten or twelve miles in breadth.

On the night of the 28th, we halted on the crest of the last sand-ridge, overlooking a horizon-bounded plain, sprinkled here and there with brushwood, and coloured by scuds of sand. You might fancy yourself standing on a high ridge of sand above the sea, so marked was the change in the character of the country. The appearance of the vegetation in Dahna was different in many respects from that of the adjacent regions. We saw little animal life throughout our march. An occasional antelope, or a hare and a few vobura, was nearly all the game we met. Lizards, snakes, and beetles were plentiful, and in great variety. Our people would kill a dozen snakes a day as they walked along, but the jealousy of the Wahabees induced me to forbid collection.

On the 1st of March we crossed the plain immediately below the western skirts of Dahna, and entered the district of Ormah at some wells which bear that name, or, more strictly, Ormahiah, in contradistinction to some other wells in the same district, a little more to the eastward. Both sets of wells are on the bank of the dry bed of a river lying from south-west towards east, a little northerly. This torrent is due to the rainshed of the highlands of Ormah along its western boundary, and loses itself in the Dahna, to the eastward. It is fringed with some Mimosa-bushes, the first trees, with one exception, that we had seen since we left Kowait. Ormah is loosely considered to be the beginning of Nejd, although, strictly speaking, Nejd, as the term implies, means the highlands, or the central plateau of Arabia. Our camels had their second drink at these wells. Leaving the wells, the country becomes more broken, resembling Sumaan, were it not for the total absence of trees in the latter district. The valleys here are more intricate. I observed, nevertheless, that the camels moved off in the morning, as they had always hitherto done, without any guide; and that they invariably took the right direction of march. One camel, however, remained with his feet tied; and the explanation was that the animal had been bought from the Dhuffeer tribe near the Euphrates, and if not hobbled would forthwith start for his home.

On the 2nd of March we traced the torrent-bed to its source in the belt of hills which form the western bulwark of Ormah; these hills formed here a vast amphitheatre to our right and left front; and in the centre of the semicircle was a remarkable gap, each arm of the hills breaking off in a scarped bluff. These hills form the

watershed of Ormah, the streams to the eastward going to the Dahna, and those to the westward falling down precipitous scarps, and losing themselves in a long ridge of sand, which forms the extreme western outwork of Ormah immediately below the hills above described, and which are known as Temamma. Our road now lay through the gap, which proved to be the most picturesque spot we had yet seen, and through which we descended by a precipitous path into a narrow belt of plain lying between the Temamma scarps and its parallel outwork of sand-ridge. We encamped on the further side of the ridge, which may be about 4 miles in breadth, immediately below a gigantic pyramidal dune; and on the 3rd of March entered the district of Shaab, being an upland plain of a few miles in width, and separating the branch scarps from the slopes of the Aridh hills, which form the eastern block of the Nejd highlands proper. Looking from the Shaab plain, we could see the bluffs of the Temamma range stretching in a north-westerly direction. The plain bears the name Shaab as far as a line a day's journey to the north of that by which we crossed it, that is to say, to the northernmost point of the Aridh hills proper; from that northernmost point a gap or recess of plain separates the Aridh hills from the Towaij range on the west. This recess is named Mehmeel, a word which implies a hollowing out. Mehmeel contains the townships of Heraimleh, Beer, and Tadij. The continuation of the plain northward of the Aridh hills, and lying between the Towaij hills and Ormah, is known as Batain; and a cultivated strip immediately under the Towaij hills, along the western border of Batain, is the Sedair, containing the townships of Owdeh, Attar, Howtheh, Rowtheh, Towaim, Keraif, Jelajel, Majmaa, and Ghat. The most northern town in Sedair is Zolfy, distant twelve days from Kowait and five days nearly from Riadth.

To return to Shaab; had we proceeded direct to Riadth, we should have turned nearly due south from our halting-place of this morning; but as I was desirous of visiting a remarkable column at the town of Seddoos, and of tracing the line of the Wadi Hanifah, we continued in a south-westerly direction across the Shaab plain, and traversed the Aridh range through the Valley of Wuttur, until we reached the town of Seddoos at its western mouth, and overlooking the Mehmeel plain, and so across to the Towaij range, distant from Seddoos about 15 miles. About midway in the Wuttur Valley we came on a small fort, with a spring, and some little cultivation. Seddoos itself is a cheerful, neat-looking town, embosomed in date-groves, with many wells for purposes of irrigation. Lieut. Dawes favoured me with a sketch of the column, which is of elegant proportions, and inscribed on its lower portion with two Greek crosses. The Arabs know nothing of its history beyond that it is of a date prior to that of the Mohammedan era.

At Seddoos we were able, for the first time since leaving Kowait, to get a few supplies. At this point also I commenced to receive friendly invitations to turn Mussulman and settle in the country. I was assured that I should have hundreds of camels, thousands of sheep, wives from the chief's own family; and that as the chief's eldest son was going on an expedition among the Khaitan tribe on the road to Mecca, I should accompany him.

Leaving Seddoos, we ascended the Aridh hills to the south, and crossing their plateaus, came gradually down a tributary of the Wadi Hanifah until we cut into the latter valley at its northern extremity, where is situate the old capital El Eyman, the birthplace of the founder of the Wahabee sect. El Eyman, though deserted, is scarcely in ruins. A stranger on approaching might suppose it to be still inhabited. It was a straggling place of considerable extent, occupying the entire bed of the valley on either side of the torrent way. Much labour has been expended in controlling the floods. Either side of the torrent-bed is traced with hewn masonry retaining-walls supporting quays, along which the principal houses were situate. The height of the retaining-walls may be from 7 to 9 feet; and I was assured that after rain the torrent sweeps between them level with their crests. The Wadi Hanifah is a ravine rather than a valley. Its average width is 200 or 300 yards, flanked with flat-topped scarps, alternating now and then with low slopes. At no point did the scarps rise more than from 100 to 200 feet. Numerous tributaries join the ravine from both sides, the largest coming from the Towaij range. Strictly speaking, the Wadi Hanifah divides the Towaij from the Aridh hills—those to the east or left-hand being the Aridh; those to the west and south, or right hand, being Towaij. Sometimes the nearer and lower ranges on the left are also included in Aridh, while only the more distant and loftier ranges are called Towaij. In loose phraseology Towaij is assumed to comprise Nejd Proper, or the provinces comprising the highlands of Central Arabia, that is to say, Al Aridh, Sedair, Mehmeel, Hareek, Wurhum, and Howteh. So considered, they stretch from Zolfy on the north to the neighbourhood of Howteh, a distance of eight days' journey.

On the morning of the 5th of March we emerged from the Wadi Hanifah on to the arid plateau, keeping the valley immediately on our right, and, passing over undulating open downs gently sloping towards the south. The ruins of Dureeyah were passed close on our right, picturesquely situate in a depression of the plateau leading down into the Wadi Hanifah. The ruins are of considerable extent. The place was in the first instance destroyed by the Wahabees when they seized Riadth from the Beni Dawass, and removed their capital thither, destroying all the

old towns along the Wadi Hanifah, and compelling the inhabitants to congregate in the new capital of Riadth. Subsequently the Wahabee ruler, being attacked by the Turks, temporarily returned to Dureeyah, as its position and fortifications were better adapted for defence. About noon of the same day we reached Riadth, and were accommodated in a garden-house set apart for Turks, Infidels, and others who smoke tobacco. I had the honour of three interviews with the Wahabee ruler, who is both spiritual and temporal head of the Wahabee territories, and in all respects absolute throughout his dominions.

The questions raised last year in this Society relating to the family of the Ameer, and to certain geographical matters, have already been commented on by me in a note which I had the honour of submitting to this Society through the obliging mediation of Sir Henry Rawlinson in February last. Time does not admit of my summarizing our return journey from Riadth through Al Ahsa to Okair; but I doubt not that when my report on this journey shall be submitted to Her Majesty's Indian Government, both these and other geographical details will be at the disposal of this Society, together with copies of my Journal, and of itineraries showing stages and distances along most of the principal routes in Central Arabia. The longitude of the Wahabee capital, as determined from our housetop at Riadth by the mean of five solar observations, is long. 46° 41′ 48″. Circumstances rendered it inconvenient for us to take the latitude, which was eventually determined by marching 5 miles in a direction north and by east, and there halting to take the north star. This observation was further tested by an observation of the polar star taken six hours before entering Riadth, and the latitude so determined is 24° 38′ 34″.

Al Ahsa is a district of which the principal fort is Hūfūf; there are, however, other six forts and villages in the same district, which is, in fact, an oasis of from 20 to 30 miles in length by 12 in width, abundantly watered by fresh-water springs, which rise to the surface, and pour themselves in copious streams among extensive grass-plats, orchards, and date-groves. Al Ahsa is, indeed, the richest, the most commercial, and with the neighbouring district of Al Khutif, the most widely-cultivated portion of the Wahabee dominions. The latitude of Al Hūfūf, as determined by stellar observation, is 25° 20′ 56″, and the longitude 49° 40′ 50″. The latitudes and longitudes of all other points noticed along my route are shown in the map, and it seems unnecessary to recapitulate them here.

*Notes on certain Questions relative to the Interior of Arabia, discussed before the Royal Geographical Society.**

Camp en route to Riadth, 14th Feb., 1865.

THE coast line between Khutif and Kowait is loosely called Adān. Strictly speaking, Adān applies to a strip of rising ground, a few miles to the southward of Kowait, and which is known to the native sailors as Hejaj-al-bent, from its supposed resemblance to the curve of a girl's eyebrow.

Proceeding inland you come on a belt of country called Hajar, or Sumaan; the term Hajar being applied to sandstone or friable stone generally, and Sumaan to a tract strewn with boulders or hard stones. This tract is of a stony pebbly character. It may have an average breadth of two days' journey. It has a general direction between north-west and north, and south-east and south. It loses itself in the great desert, called Rob-al-khali, on its southern extremity, and in the great uninhabited tract lying to the west of the Euphrates, on its northern extremity.

Leaving the Sumaan and still proceeding inland, you come on a second and parallel belt, known as the Dahna or Nefood. This tract also has an average breadth of two days' journey, and, like the Sumaan, merges at its south-eastern and north-western extremities in the two deserts above alluded to. This belt is formed of a succession of mounds or waves of sand, popularly stated to be seven in number—Dahna being a name given to a tract composed of sandy mounds, and Nefoods implying a succession of such mounds.

Leaving the Dahna you come again on a tract of various breadth lying between the Dahna and the highlands forming Nejd proper. This tract is known under different names at different points; for instance, at its narrowest part, being that immediately beneath the Towaij hills, it is called Sedair. Further south, that is, between the Mehmeel district and the Dahna, it seems to have no distinctive name, but is sometimes called Sedair, and sometimes Mehmeel. Still further south, that is, between the Dahna and Aridh, it is called Ormah.

The hill line immediately within the above-mentioned tract forms the eastern highlands of Nejd proper. This hill line runs in a general direction of north, a little west and south, a little east. At its northern point is Zolfy; and from Zolfy down to the village of Owdeh the range is known as Al-Towaij. This is the highest portion of the eastern highlands of Nejd. Below Owdeh there is a break in the range stretching from one to two days' journey, namely,

* All the proper names here mentioned are repeated in the original Arabic in the margin of Colonel Pelly's official report, from which these Notes are printed.

from the village of Tadij to the old town of Seddoos. The plateau formed by this break is called Mehmeel. From Seddoos in a southerly direction the country again rises, and so reaches Riadth, distant one long day's journey, through the villages of Ayneh, Jebeeleh, and the old Wahabee capital, Dureeyeh. These highlands to the southward of Seddoos are known (as above stated) as Al-Aridh. The Wadi Hanifah cleaves the Aridh from Ayneh through Dureeyeh (which was situated half on one side of the valley and half on the other) towards Riadth, and afterwards bends in an easterly direction.

In describing the character of the country as above, between the Persian Gulf and Nejd, I have described it as it would be crossed, coming, for instance, from Kowait to Riadth; and I have not taken into consideration the regions of Washm, Kassim, and Jubbul Shummur, lying to the westward or northward of Al-Towaij, and which, either politically or geographically appertain, at the present moment, to Nejd.

The hill district, generally, in which Dureeyeh and Riadth are situate, is known as Al-Aridh;* and it is only the valley which cleaves the district which is known as Wadi Hanifah. It was this Wadi, perhaps, or a branch from it, which, before it was conquered by the orthodox Mahomedans, was known as the Wadi Aftan. Usually it is quite dry: after heavy rain it becomes a torrent, the bulk of the water losing itself in the sands to the southward and eastward. The general watershed of the central highlands of Arabia seems, indeed, to be to the southward and eastward.† The water which is lost in the sands‡ to the southward, draining probably under the sands of Rob-al-khali; and that which passes to the eastward draining under the sands of the Dahna, and reappearing, firstly, in the lower level of Al-Ahsa; secondly, in the yet lower plain of the sea-board near Ras Tannara and Khutif; and thirdly, in the sea itself, at a depth of four or five fathoms, near the island of Bahrein.

From Riadth, two days' journey, in a south-westerly direction, is the Kharj district, sometimes known as Al-Yemamah. Tradition asserts that this region, now in part desolate, is the remnant of what was once the considerable State of Yemamah, destroyed, partly by encroachment of the desert, and partly by political convulsion. I infer that Al-Yemamah originally extended from the present Kharj or Yemamah in an easterly direction to the shores of the Persian

* This Al-Aridh must not be confounded with Al-Ardh, a range of hills stretching in a westerly direction near the road from Riadth to Mecca.

† It is asserted further that this general direction of watershed obtains from the confines of Yemen and Hejaz.

‡ I conjecture that there must be lakes, or that water must be discoverable below the sand in the direction of the Hadramaut, and eastern Yemen.

Gulf; thus including the present district Al-Ahsa, then known as Hājr, and having its provincial chief town of Hājr, now in ruins, two or three days' journey south-west of the present provincial chief town Al-Hūfūf.

The present town of Al-Yemamah is said to be on the site of the old capital: it is not in the valley, but in an open plain. It is six or seven days' journey from the present Al-Hūfūf, and is four or five days' journey from the former chief town of Al-Ahsa Hājr. The town of Suleimiah is in Yemamah, that is, in Kharj.

There is running water, and there are extensive date-groves in Al-Yemamah. But this water is said in part to come from a source named Seh, a little to the southward where the Ameer grazes and waters some of his horses, and in part to be derived from nearer springs and wells. There is no water flowing above ground from Bisha, or from the Dowasser valleys to Al-Yemamah. No water reaches the Persian Gulf, in the form of a river or perennial stream, at any point along its Arab shore, between Kowait, at the head of the Gulf, and Cape Mussendom, at the entrance of the Gulf.

The general law of the watershed of the peninsula of Arabia, from the eastern confines of Hejaz and from the central hills and plateaux, seems to be that of a southward and eastern direction—that is to say, in the same manner as the watershed of eastern Nejd percolates towards the lower levels of the great desert on the south, and of Al-Ahsa, Al-Khutif, and the Persian Gulf, on the east; so does the water of the southern Nejd find its way into the lower levels of Al-Yemamah, Al-Howteh, Al-Harij, &c., with waste to the great desert; and so does the water from Al-Ardh, and from Hazm-er-Rajee, and from the highlands on the eastern boundary of southern Hejaz, find its way to the lower levels of the Bisha, the Wadi Dowasser, and the Afladj-e-Dowasser,* with waste to the great desert after supplying the cultivation of the above districts.

Leaving Riadth and returning to the Persian Gulf by way of Al-Ahsa, you cross the same sort of country which you crossed in going from Kowait to Riadth, only in reversed order of course: in other words, leaving Kowait you have a march of twelve long caravan days, in a general direction of south-west and by south, of which the first five days are in a diagonal direction across the rolling open ground loosely called Adān; then for two days across the stony tract of Sumaan; then for two days across the sand-hills of the Dahna; then for two days across the rolling and plain ground intervening between the Dahna and the Nejd highlands, called Aridh; and then finally one long day through the Aridh to

* The Afladj is not a province of itself, but, as its name denotes, is that portion of Dowasser which is watered by Kanaats or underground water-ducts. Its full name is Afladj-al-Belad-ad-Dowasser, or the Kanaats of the villages of the Dowasser.

Riadth. While in returning from Riadth to the Gulf by way of Al-Ahsa, you have first three days across the Aridh and its adjacent ground; then two days across the Dahna (which seems to be more commonly called Nefood, as it falls away towards and merges itself in the great desert); and then two days across the open stony ground of Sumaan or Hajar; and then either two days (full) to the shore line at Okair (erroneously called Ojair); or four days (full) to the shore line at Khutif. In either case you pass through the chief town of Al-Ahsa district, Al-Hūfūf. From Khutif to the boundary of Al-Ahsa district is two days' journey nearly; and thence to the chief town, Al-Hūfūf, is two days' journey. Al-Hūfūf is rapidly pronounced Al-Fuf. It is commonly known also as Khot-al-hufuf, from the ancient citadel there; in part of which the Wahabee governor still resides.* Sometimes Al-Hūfūf is called Al-Ahsa, after the name of its district.† The ancient name of the district was Hājr. Its chief town bore the same name. It is said that the ruins of a large town of this name are still visible two or three days' journey distant in a south-west direction. Hājr is said to have been a province of ancient Al-Yemamah. It is added that the decisive battle which gave these regions to the Faithful was fought near Hājr.

Some confusion seems to have existed in regard to the three names.

Hājr, the ancient name for Al-Ahsa, and its chief town.

Hājar, the name of stony belt, called also Sumaan.

And Okair, the name of the sea-port, erroneously called Ojair.

These names are, however, of entirely distinct origin.

Okair means a small excavation, or something cut away, in allusion, apparently, to the small inlet or islet at the point on the coast where Okair is situate.

Khutif is the present port of the old district of Kutf, which was conterminous with the Hājr province. Kutf was of greater extent than the present range of date-groves and gardens round Khutif. But the district was encroached on by the sands of the desert from the landward. The word Kutf is said to mean plucking, in supposed allusion to its date-harvest. Khutif, is the passive, plucked, or something seized from another person, in allusion, it is asserted, to the Kerāmata sect, who seized on Al-Ahsa or Hājr and Kutf in the third or fourth century of the Hejra, and carried away the famous black-stone from Mecca to Khutif, intending to make this latter place supersede Mecca as a place of pilgrimage.

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* The town of Muburriz, being the next important town of this district, is distant only a couple of miles to the northward of Al-Hūfūf.

† To the east of the town are some hills known as El-Gharra, containing large caverns, whither the people repair for coolness in the hot season.

It appears there are two Al-Ahsas: that above referred to and known as Al-Ahsa Al-Bahrein (from the adjacent island of Bahrein); and secondly, that near Medina on the road towards Mecca, held by the Beni-Saad of Al-Hareb.

The largest island of the Bahrein group was called Awāl, after the name of the first chief who settled there, in the same manner as the island on the opposite coast was called Kais.

I am told that the remains of a considerable town are buried under the sand on the sea-shore, at a distance of one and a half day's journey, on the road from Khutif to Okair. Is this the ancient Hamas or Hams?

I cannot find that there is any record or sign of any settlement along the shore line from Khutif to Kowait. This shore line is never traversed.

There is a road of eight days' journey in length, a little inland from Kowait to Al-Ahsa. To the right of this road coming from Kowait, and at four days' journey distance from that place, are said to be the ruins of an enormous stone fort, called Tāj, traditioned to have been built in the time of Nimrod.

While referring to antiquities, I may mention that I am told there is a mound, about two hours' ride north-east of Jelajel in the Sedair, with an inscribed stone on its top. The mound is called Al-Grief. The character of the inscription is of very ancient date.

At Seddoos in Al-Aridh is said to be a monolith of great altitude.

To return to the coast line at Kowait. The present town of Kowait is only from 100 to 200 years of age. The name is a corruption or diminutive of Khot, or fort. The ancestors of its present chief were the pirates of the mouths of the Shat-al-Arab. Their original fort was at Omkuner, at the head of the Zobeir Creek. I may mention that I have explored the Zobeir Creek to its head, carrying four or five fathoms water up to its head within sight of the date-trees of Basrah. I took my native craft up the creek between the island of Boobian and the main, carrying four, six, to nine fathoms throughout. This latter creek would not, however, suit shipping, as there is only one fathom outside its entrance. The best approach to the Zobeir Creek is up the Khor Abdullah.

The bay of Kowait is also called Gurn, or horn, in allusion to the shape of the bay.

At the north-west angle of the bay is a fort, called Jaharah. This is said to be on the site of the ancient Ghiranhensis. Be this as it may, bricks and other remains are found in digging near the fort. It is in this fort that the horse-dealers collect their horses from Nejd, previous to embarkation for India. The various breeds of Nejd horses are of all colours, and vary in height from 14·1 to

14·2 average. A horse of 14·3 is a large Nejd horse. Some of the very highest caste, of the finest form and greatest endurance, are 14·1, or even under. Within the past few days I have myself seen or ridden a chesnut-coloured Saglawiyeh mare, a bay Hamdāny mare, two grey Obeyahs, and a nutmeg-coloured Kohaileh mare. The commonest colour is grey, shading from dark nutmeg up to almost pure white.

The Arabs consider that a horse should be ridden young. The Aneyzeh commence to ride, they say, too young. But a colt of two years should always be ridden: it consolidates him and makes him lasting. Hence a colt brought up among the Bedouins is more valued than a colt of Bahrein, although the caste of horses on this island is pure. But the colts are pampered. A Bedouin considers that a colt requires desert air, desert exercise, camel's milk, and some dates. It is said that when pushed a Bedouin will kill a sheep for his horse or mare, feed it on the raw meat the first day, and then on the soup. I observe that the Arabs about me rarely put a bit in the horse's mouth, only a slight halter over the nose. Yet the horse seems under absolute command, even at full speed. The docility of the animal is certainly very remarkable. Some of the horses to the southward among the sand-hills are taught to lie down like a camel, when their master scratches the ground with a stick, and then to turn over on their side and so elude the sight of an enemy in the distance.

The part that camel's milk and locusts play in the food of the Bedouins and other Arabs is very noticeable. During the spring, when the camels find grass, an Arab will live entirely on camel's milk. He considers it an alterative to his blood, and as very fattening. It is said that living on this milk gives one a disgust for other food, especially for animal food. I have been assured from so many and so credible independent sources, that numbers of Arabs and Arab horses do live and thrive without putting anything into their mouths except camel's milk, for months together, that I cannot doubt the fact. As to locusts, they eat and relish them in all classes. The Bedouins store them, and they may be said to form with dates a staple of food.

There are five principal breeds of horses:—

1st. Saglawiyeh ben Jidran.
2nd. Kohailet-al-Ajooz.
3rd. Obayet-ash-Sherrak.
4th. Dahmat-ash-Shehwan.
5th. Waznat Khersan.

The first breed is not now procurable in Nejd; but a limited number of horses of this breed is still to be obtained among the Aneyzeh tribe.

Horses of the Saglawiyeh (1st breed) on one side with dam or sire of one of the other breeds, are procurable in Nejd.

From the second, Kohaileh breed, are derived the Shivaiman, Hamdaniyeh, Hudbeh, Rabdeh, Shohaib, Merady, Zohaiya, Maangieh, Towaysch, Atrafieh, Jarieh, Jazieh, Hargah, Jerrada, &c. &c.

This second breed is usually recognizable by the straight, free action of the fore legs.

The third, fourth, and fifth breeds do not change their names even when mixed with other breeds. An Arab often thinks little of the sort of horse that commands the highest price at Bombay. He seeks first, and doubly first, caste; afterwards he looks to form. He cares little or nothing for height, unless with a view to the export market: on that *ceteris paribus* he would prefer a roomy mare to a small one.

It appears that the family of the Imams of Muskat were originally Sayeds of a village, named Rowtheh, in the Sedair immediately below the Towaij hills. The founder of the family was Saeed. His son's name was Ahmed. They came to Oman and took service under the dominant tribe, called Yarebeh. Subsequently they obtained possession of the strong hill-fort, called Hazm, in the neighbourhood of Rostak. Eventually they became the rulers of Oman, and changed their sect from that of Sunnee to Beyāthee. Ahmed's son, Sultan, was styled Imam. Sultan being killed, was succeeded by his son Sayed Saeed, who rendered his State a first-rate Asiatic maritime power, and took possession of the coast-line of East Africa from Cape Delgado * to Brava and Magadoxa, including the old Portuguese settlement of Mombassa and the islands of Zanzibar, Pamba, Monfia, &c. He further developed his trade at the entrance of the Persian Gulf from Bunder Abbass along the Mekran coast. Sayed Saeed dying, two of his sons disputed succession. The question was submitted to the arbitrament of the late Earl Canning, who divided the State of Muskat, giving the African possessions to one brother, Maujed, under the title of Sultan of Zanzibar, and giving the coast of Oman to the other brother, Soweinee, the present ruler, under the title of Sultan of Muskat. No one, however, except ourselves acknowledges the title Sultan. The title was Sayed, and remains Sayed; and when the people wish to speak with reverence of the late Sayed Saeed, or Sayed Sultan, they remember him as Imam.

The mountain-chain running along the coast-line of Oman is said to be comparatively well-watered on both its inland and seaward slopes. It has many spots where fruit and vegetables thrive.

* Or rather the line of the River Sindee, a little to the southward.

The range has been little explored by Europeans; but I doubt not that many interesting facts may be collected there.

In regard to the Wahabee power, the principal facts of the case may be briefly summarised as follows:—There was a certain Mohammed, son of Saood, belonging to a tribe of the Aneyzeh called Mesalikh, and he was Rayes or chief of a small family, who cultivated the suburbs of Dureeyeh, in the Wadi Hanifah. There was at that time also a man named Abd-al-Wahab, of the tribe of Beni-Temem, born at Ayeneh, in the vicinity of Dureeyeh. He was a learned man, and had sought out the true knowledge of God, at Busrah, Baghdad, and Damascus. Afterwards, that is to say, in the year of the Prophet Mohammed, 1160, he came to Dureeyeh, and reproved the people in that they were ignorant of the true law and prophet. Mohammed, son of Saood, and his followers, accepted his teaching, and agreed to kill everybody who did not do the like. So Mohammed, son of Saood, went down to Riadth and attacked the place, and continued fighting there for about 30 years; and he slew Deham, son of Dawass, of the tribe of Douneser, chief of Riadth, and took possession of his city, slaying also many others who would not believe. Those who escaped fled the country, and Mohammed, son of Saood, then went down upon Al-Ahsa, slaying a great number of the tribe of the Arayer, who inhabited that region. Mohammed, son of Saood, had two sons, Abdallah and Abdalazeez. And Abdallah begot Torky, and Torky begot Faysul, the present ruler of Nejd, and sometimes styled Amir, but more properly Imam. He is now approaching 70 years of age, and, though blind, is at once both respected and feared by both Bedouins and settled Arabs within the circle of his extensive dominions.

From Abdalazeez above-named came one Saood,* and from him Abdallah. It was this Abdalazeez and his son Saood who extended the Wahabee dominions until they embraced nearly the whole of the peninsula of Arabia, including the holy cities of Mecca and Medina, but not including Yaman or the Hadramaut. Subsequently, and after protracted resistance, the Wahabees were overcome by Ibrahim, Pasha of Egypt. Saood dying, Abdallah, together with his brother Khaulid, were carried prisoners to Constantinople. Ibrahim Pasha then destroyed the old Wahabee capital, Dureeyeh, and levied a tribute on the Wahabee power.

At the first rise of the Wahabee sect the family of Abdal Wahab were associated in power and authority with the family of Ben Saood—the former holding spiritual sway, and the latter tem-

* Saood was about to conquer Yemen when he was recalled to his capital by the news of his father's death.

poral. This double form of government has, however, passed away. Abdal Wahab had three descendants—Sheikh Mahomed, Sheikh Hassan, and Abdal Rahman: the last named is now about 90 years of age, resides in a retired manner on his own estate near Riadth, and is the sole living representative of the family of Abd-al-Wahab.

Faysul, the descendant of Ben Saood, enjoys the title of Imam, or religious leader. He is in all respects absolute in his dominions. The Cazyship resides in a subordinate family, and though the tenets and practice of the Wahabee sect continue to be the severest among all Mohammedans, yet the Imam brooks no opposition, whether from Mollah or from the numerous members of his family.

Geographically considered, Nejd, as the term implies, means *the highlands*, in the heart of Arabia. So considered, it would include the Towaij hills and the Aridh on its eastern frontier, Kharj and Howteh on its southern, Arh, Washm, and Kassim on its western frontier, and Jubbul Shummur on its northern.

Politically considered, the present frontiers of Nejd coincide with the existing frontiers of the Wahabee Amir, and are as follows:—

On the west, a line drawn nearly north and south between Hejaz on the one side and the Wadi Dowasser and Hazm-ar-Rajee hills on the other. Wadi Dowasser is on the southern extremity of this frontier, and Jowf-al-Amar on its northern extremity.

On the south, Nejd is bounded by the Rob-al-Khali, or Great Desert, from the Wadi Dowasser, on its western extremity, to an undefined point in the desert towards the Persian Gulf.

On the east, the Nejd frontier comes down to the Persian Gulf from Kowait, on the northern extremity of this line down to Abuthabi. Passing Abuthabi the frontier line keeps a little inland, behind the *quasi* independent maritime Arab settlements on its pirate coast, until it reaches Bremy, where the frontier line turns south-east, and runs behind the hills of the Muskat dominions of Oman.

On the north, the frontier line of Nejd stretches from Jowf-al-Amar above-named, to the immediate neighbourhood of Kowait, on its eastern extremity.

The Wahabee power of Nejd within the above limits may be considered as a confederation of Arab tribes, whether Bedouin or settled, subdued to one autocratic will, and bound together by motives of interest and religion, for common defence and for aggression in common. The tribes so confederated are now noted below.* Those residing in the highlands proper of Kassim,

* Al Amoor, As Sebaa, As Sehool, Aul Shaumer, Aul Qiman, Motair, Beraih, Harb, Shammar Anayzeh, Aul Marrah, Kahtann, Ottaibeh, Ad Dowasser.

Washm, Aridh, &c., and in the adjacent cultivated valleys, are mainly settled. But on the wide plains which surround these highlands the Arab is a pastoral wanderer, and from the nature of the climate and country will probably remain so; for instance, on the great plains stretching between Kerseit and Riadth the two tribes Al Motair and As Sebaa wander during the winter and spring, then bring down their produce, whether of wool, rowghun, horses, flocks, &c., to Kowait and the shore line, selling as opportunity may offer, and taking back with them to their summer haunts dates, coffee, a few piece-goods, bamboos for spears, and other necessary articles. In passing through a country like Nejd, much depends on the season of the year. Pass through the highlands in winter, and you may scarcely meet a Bedouin. You may pass through the lower plains in summer with the same result. Return to the highlands in summer, and to the lowlands in winter, and you may fall in with black tents at all points.

Those tribes who are under direct confederation of the Amir yield him certain revenue, whether in kind, horses, or service, and are guaranteed certain assignments, whether of dates, cultivable land, or pasturage. But these tribes do not represent all the Amir's relations. He has others less close, but still direct, as follows:—

1st. The tribes of Jubbul Shummur yield him tribute, and expect military aid in the hour of need.

2ndly. Certain tribes are allowed to graze unmolested by the confederate tribes within or near the frontier of Nejd. But if a tribe of this class should be attacked by a tribe not under the authority of the Amir, the latter would not interfere.

3rdly. Tribes, such as the large tribe of Dhuffeer, with whom the Amir engages on the one side that they shall not molest the confederate tribes, and on the other hand that the confederate tribes shall not molest them.

4thly. Tribes who are independent within themselves, whose chiefs the Amir has not authority to remove, but who nevertheless pay him tribute, although they cannot claim protection or aid. Under this class fall the Sultan of Muskat, the maritime Arab settlements of the pirate coasts, and the chieftain of the Bahrein Islands, all of whom pay tribute as now noted below.*

The richest province under the Amir's rule, and that which boasts the most skilled labour, is that of Al-Ahsa, inclusive of Khutif. It is at Al-Ahsa that the Arab head-dress, the "Cheffiah," and the "Abbah," or cloak, are made; and it is here also that are found by far the most extensive date-groves.

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* Sultan of Muskat, 6000 dollars; Chief of Bahrein, 4000 dollars; Maritime Chief from Ras-al-Khaimeh to Abuthabi, 12,000 dollars.

The Amir has two military outposts, the one at Bremy, astride of the promontory of Mussendom, between the Muskat territories and those of the maritime Arabs; and the other at Al-Hūfūf, chief town of Al-Ahsa. It is said that the military requirements and administration of these and other provinces swallow up a large portion of the revenue; and it is added that these two military deputies, who are brothers, might possibly become independent if the rule of Nejd were to devolve on any person less able and less liked than Amir Faysul.

The Amir himself in turn is *alleged* to pay a tribute of 10,000 dollars per annum to the Turkish government. He also, it is said, sends annually presents of Nejd horses. A deputy comes to Riadth annually for these horses and tribute, and it is said that the horses which he took back two years ago were so little approved at Constantinople, that inquiries were made as to the falling off of the breeds. The explanation given was, that the demand for good horses from British India is greater than the supply. The Porte prohibited the export of horses from Nejd for a period of four years.

As regards trade, Khutif is considered as the most direct port of the Nejd dominions. Some trade also goes on with Kowit. Traffic also, no doubt, finds its way along the various pilgrim routes which pass to Mecca through Nejd, whether from Persia or Turkish Arabia. The Wahabees receive their coffee—of which they drink an immoderate quantity—from Yaman by way of Sanaa and Nejran, the Wahabee traders receiving it at the latter point, or at their own frontier of Dowasser. The Arabs of the littoral smoke freely, obtaining the tobacco for their nargheel from the Persian province of Lar, and that for their pipes from Mosul or from Yaman, by sea. In the interior smoking is strictly prohibited, as is also the wearing of silk, and swearing. A Bedouin or other Wahabee found smoking would be killed. An amusing story was related to me yesterday of a man who complained to the Amir's son that one of his neighbours smoked. "How do you know it?" asked the Amir. "I smelt it," replied the man. "Then you entered your neighbour's private apartment," rejoined the Amir. "No," said the man; "I just put the tip of my nose in." Whereupon the Amir ordered the executioner to snip off the tip of the complainant's nose, so as to save it from the temptation of sniffing in another man's harem for the future.

I do not find that a man of the Wahabee confederation would object to marriage with a woman from a tribe other than Wahabee. A settled Arab, whether Wahabee or otherwise, would probably object to his daughter marrying a Bedouin; but this not on account of religious or tribal prejudices, but from disinclination to subject his daughter to Bedouin life.

There seems to be a good deal of quiet fun going on under the strict and fanatical exterior of the Wahabees. They are warlike Mohammedan Quakers. The tribes to the northward are much freer in their ideas, or no ideas. A Mollah from Wahabee went to convert some of the Aneyzeh tribes. He pointed out to them that those who pray and fast go to heaven ; while those who neglect these pious offices go to hell. He reminded them that they neglected both the prayer and fast. "Good," said an old Aneyzeh. "But who is the Wukeel for getting into heaven?" "The Prophet Mohammed," replied the Mollah. "And do you suppose," asked the chief, "that when he sees us Aneyzeh coming on our thorough-bred horses, he wont be very glad to open the door and let us in?"

*Note on the Selaib Tribe.*

A few miscellaneous remarks on the Selabah or Selaib tribe, based on information collected among themselves, may be interesting.

The caste is called Seleb or Selaib, because on certain festivals, and particularly on occasions of marriage and circumcision, they fix a wooden cross, dressed in red cloth and adorned at the top with feathers, at the door of the person married or circumcised. At this signal the people collect and dance round the cross. They have a particular dance. The young men stand opposite their female partners, each advances, and the youth slightly kisses the shoulder of the maiden: anything like touch of the hand or waist is out of etiquette.

The word Seleeb means a cross. But some of the caste derive their name from As-Solb-Al-Arab, *i. e.*, from the back of the Arabs —meaning to assert that they are pure descendants of aboriginal Arabs. The Mohammedans, on the other hand, stigmatise them as outcastes. The tradition is that, when Nimrod was about to cast Abraham into the fire, some angels appeared and protected him. Eblis or Satan then made his appearance and pointed out to the bystanders that if some one would only commit a shameful crime, the angels would be obliged to depart, and thus Abraham would be left unprotected. Upon this one of the Arabs lay with his own mother, and forthwith the angels fled. Upon this the angel Gabriel came to the rescue, and changed the spot where the fire was kindled into a garden. The descendants of the man who lay with his mother were, thenceforward, called As-Selaib.

The Selaib who have emigrated into Nejd and other Mohammedan settlements conform outwardly to the religious rites and ceremonies of the dominant creed. But in their own tents, or when alone, they do not so conform.

No intermarriage takes place between the Selaib and the Arabs. Even a Bedouin will not stop to plunder a Selaib, nor to revenge a

blood feud against him. The Selaib are capital sportsmen. They live largely on deer's flesh, and wear a long shirt of deerskin coming down to the feet. Their common diet is locusts, and dates when procurable; but they will eat anything. They tend their sheep and camels, wander for pasturage during eight months of the year, and for the remainder seek some town or village where to exchange their produce for necessaries of life. Their tents are black, of goat's hair, and are pitched separate from those of the Arabs. The Selaib are filthy in appearance; but the Arabs confess that, in point of features, the Selaib women are the most beautiful among them.

Forty days after birth a child must be washed, being dipped seven times in water.

Marriage is contracted by mutual consent of the parties. The assent of the father, or failing him, of the nearest of kin, must also be obtained. The father of the girl receives some sort of payment, according to the ability of the bridegroom. The parties go before a mollah, or an elder of the tribe, who asks them three several times if they freely consent to the union. The parties replying in the affirmative, the mollah takes his fee, and they cohabit. The neighbours then collect at the tent, sheep are killed for them, and they dance. The only invitation is the sign of the cross fixed outside the tent.

The Selaib wash their dead, cover the body with a white shroud, and inter it with a prayer. Failing a white shroud, they use a new shirt of deer-skin.

They profess to reverence Mecca, but state that their own proper place of pilgrimage is Haran, in Irak or Mesopotamia. They say also that their principal people have some psalms and other books written in Chaldean or Assyrian. They respect the Polar star, which they call Jah, as the one immoveable point which directs all travellers by sea and land. They reverence also a star in the constellation, called Jeddy, corresponding with Aries. In adoring either of these heavenly bodies the Selaib stands with his face towards it, and stretches out his arms so as to represent a cross with his own body. They believe in one God. Some of them pretend to believe in Mohammed. Others deny the prophet, but trust in certain intermediate beings, who are called the confidants of God. They pray three times a day: first, as the sun rises, so as to finish the prayer just when the entire disc is above the horizon; secondly, before the sun begins to decline from the meridian; and thirdly, so as to finish the prayer as the sun sets. It is asserted, however, that the Selaib of Haran have pure forms of prayer, in the Assyrian or Chaldean. They fast three times a year: for thirty days in Ramadan; for four or seven days in Shāban, and for five or nine days in a summer month. They are peaceful, and are un-

disturbed by the Arabs, who hold them below injury. They are markedly hospitable, like all people who have nothing to give. They assert themselves to be a tribe of the Sabians emigrated to Nejd. The Mohammedans deny this. The Selaib eat carrion and profess themselves to be the chosen people of God, who pay no tribute or tax, since no one will deign to receive it from them.

I have not as yet come on any people practising sun or fire worship. It is vaguely asserted, however, that persons of these religions are to be found in the direction of Al-Yemamah. Some of the Arabs bear names obviously derived from the old astronomical religion, viz., *Budhr* (Moon), *Shums* (Sun), *Zohra* (Venus), &c.

There are two sources of confusion in the statement of distances in Arabia:—

1st. A man who rides post tells you the distance in day's journey, according to his rate of travelling. The caravan traveller does the same. For instance, a courier tells you it is two days' journey from Khutif to Al-Hūfūf, and four days' from Al-Hūfūf to Riadth. A caravan-man, on the other hand, would say four days to Al-Hūfūf, and seven to Riadth.

2nd. The second source of confusion results from the distance being measured to the nearest boundary of a district, instead of to its chief town: for instance, in going from Bunder Abbass to Minow, the people tell you that the distance is twelve fursacks; and when you cover that distance, the guide points to a small watercourse as the beginning of Minow, being, in fact, the first land watered from the Minow river. The town of Minow itself is three fursacks further on.

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XVI.—*On the New Settlement in Rockingham Bay, and advance of Colonization over North-Eastern Australia; including Mr. J. E. Dalrymple's report on his Journey from Rockingham Bay to the Valley of Lagoons.* Documents forwarded by Sir G. F. BOWEN, Governor of Queensland.

Communicated by the COLONIAL OFFICE.

*Read*, November 27, 1865.

IN a despatch to the late Duke of Newcastle, Sir George Bowen writes as follows on the subject of the new settlements in North-Eastern Australia:—

I have the honour to transmit herewith copies of a private letter addressed to me by Mr. Arthur Jervoise Scott, Fellow of All Souls College, Oxford, giving an interesting description of the foundation of a new settlement in Port Hinchinbrook, at the southern end of Rockingham Bay. This is the site and harbour selected by

myself, in conjunction with the late lamented Commodore Burnett, on our return voyage from Cape York in H.M.S. *Pioneer*, in 1862, and afterwards in 1863 surveyed and strongly recommended by Captain Richards, R.N., then commanding H.M.S. *Hecate*, and now the Hydrographer to the Admiralty.

The official report of the Commissioner of Crown Lands, who accompanied the expedition, fully confirmed the remarks of Mr. Scott. The new settlement, to which a considerable number of persons have already proceeded, has been proclaimed as a port of entry and clearance, and a police magistrate and subcollector of customs have been appointed there. As the harbour is one of the best on the eastern coast of Australia, it will at once become the outlet for the pastoral settlements which have already overspread the northern portion of the Kennedy district, as well as portions of the districts of Cook and Burke. A paper which I enclose shows that our pioneer "squatters" have already occupied the banks of the River Lynd, which flows into the Gulf of Carpentaria. They are also fast pushing forward along the banks of the River Flinders, and it is expected that there will be stations on the shores of the Gulf itself within the next 12 months.

It will be seen that, as in all other instances of colonization among savage races, occasional loss of life is inevitable among the first settlers in each new district in Queensland. But this very fact lends to the efforts of our pastoral adventurers a tinge of danger which is of itself fascinating to many minds. As I remarked once before, there is something almost sublime in the steady, silent flow of pastoral settlement over North-Eastern Australia. Although it is difficult to ascertain exactly what progress may have been made at the end of each week and month, still at the close of every year we find that the margin of Christianity and of civilization has been pushed forward by nearly 200 miles. When I assumed office as first Governor of this colony, in December, 1859, Rockhampton, on the River Fitzroy, was the furthest township towards the north. Already in April, 1864, there are inland stations nearly 800 miles beyond Rockhampton by the nearest road. Again, just three years ago, in April 1861, the first white men landed at Port Denison in Edgecumbe Bay, where a flourishing township has already sprung up, with its mayor and corporation, its banks, stores, shipping, and even its cricket and boating clubs.

It is expected that the progress of the new township at Rockingham Bay will be still more rapid than that of the township at Port Denison. Indeed, it is confidently believed by many persons that the former, from its excellent harbour, from its central position, and from the vast and rich "back country" of which it will be the shipping port, will one day become the capital of the new

colony, which may probably at no distant period be formed out of the northern districts of the existing colony of Queensland.

### *Mr. Scott's Letter on the Foundation of the Settlement at Rockingham Bay.*

Port Hinchinbrook, Rockingham Bay,
February 8, 1864.

I now send a short account of our expedition to Rockingham Bay, where we have been established for about a month. We started from Port Denison on the 7th of January, in the schooner *Policeman*, owned and commanded by Captain Powell. Our party consisted of Mr. Tully, Commissioner of Crown Lands in the Northern Kennedy district, Lieutenant Marlow, of the Native Police, three black troopers, Mr. G. E. Dalrymple, Mr. Selheim, Mr. Farquharson, Mr. Müller, a market gardener from Port Denison, Mr. Dalachy, botanist, myself, and 12 white men, carpenters, bushmen, &c., with some supernumeraries for the protection of the settlement, and a black from the tribe on Stradbroke Island, Moreton Bay. We had on board, also, ten horses, a dozen sheep, a couple of goats, some fowls and dogs. We met with contrary winds and calms during the greater part of the voyage; and, consequently, had to put into Cleveland Bay to get grass and water. We arrived in Rockingham Bay on the evening of the sixth day, the 12th of January, and landed under Hecate Point, so named by Captain Richards, R.N., now Hydrographer to the Admiralty. The next two days we spent in sounding and looking for a suitable landing-place for the horses, which we found on the sandy beach recommended by Captain Richards for a town site. The *Policeman* was run in at high water, with her bowsprit over the sandy beach, while she herself lay in the soft clay, of which the bottom of the whole bay seems to be composed; and the horses were all landed in safety on dry land. We were more fortunate in this than in the embarkation at Port Denison, when we lost our only draught horse, which was strangled in the slings. The other horses landed in first-rate condition, and seemed none the worse for the trip. The next fortnight was spent in a thorough examination of Rockingham Bay, both by sea and land. We shifted our camp about a mile from our first landing-place, and I think we have now found the best place for the settlement. In choosing the exact site it was an *embarras de richesses*, for the gravelly ridge on which we now are extends for about 2½ miles, the whole of it being suitable for a township; while in Port Hinchinbrook there are several localities which would serve our purpose. We were therefore guided in our selection by the probable course of the road from the interior and by the most convenient supply of water. The water at present is abundant everywhere, and several small streams, apparently per-

manent, flow down from the ranges immediately behind the town site; some of these appear to find their way to sea under the porous soil; for, sinking anywhere in the beach, we come to excellent fresh water a few inches below the surface, and we drew our supply for the camp from a barrel sunk in the sand, just below high-water mark.

Mr. Tully has surveyed a few sections of the proposed township, a plan of which, I believe, he has forwarded to the Government for their approval. The site is on the mainland, about $2\frac{1}{2}$ miles south-west of Hecate Point. Large ships can lie at anchor about a mile off, while vessels of a light draught can come close in. The rise and fall is at least 12 feet at spring tides, and the bottom being of soft blue clay, any vessel can lie within a few yards of the shore without the slightest danger. The bay is perfectly sheltered by Hinchinbrook and Goold Islands from the prevailing winds from the south-east, while Dunk Island, the Family Group of islets, and numerous shoals, prevent any great sea from the north-east. Should a storm come from that quarter a vessel could run in a few minutes into Port Hinchinbrook, where she would be perfectly sheltered on all sides. Altogether I believe this will prove to be the best harbour in Queensland; and the *Great Eastern* herself could lie off Hecate Point or in any part of Port Hinchinbrook, the deep water in which extends for several miles to the southward.

The ridges on which the township will stand are of a coarse quartzose sand, perfectly dry in any weather. We have had a week's heavy rain, and at this moment they are as dry as they were before it fell. Abundance of timber suitable for building is to be procured close to the town, principally consisting of *melaleuca* (tea-tree), *Brigalow*, and a species of "stringy-bark" called by the bushmen *Messmate*, and which splits into excellent slabs.

A few days after our arrival, a small cutter, belonging to Mathews, of Port Denison, came in: the crew have been busy ever since they arrived in splitting slabs. The men express great satisfaction with the timber, and say that it is unequalled in any part of the coast-country of Northern Queensland that they have yet seen.

The grass in the immediate neighbourhood of the town is coarse, and it would be called third-class pastoral country; but under the ranges there are patches of good country quite sufficient to feed any amount of stock required for the settlement.

The climate appears much the same as that of Port Denison, and we get the same sea-breeze. I suppose from the latitude that the thermometer is a little higher; but the heat is not oppressive, and we have the great advantage of being almost entirely free from mosquitoes and sand-flies. We are all of us now sleeping without mosquito curtains.

For the growth of tropical produce we have the authority of Mr.

Hill, the director of the Botanic Gardens at Brisbane, that the country in this vicinity cannot be surpassed. Mr. Dalachy, the botanist sent up with the expedition by Dr. Muller, of Melbourne, endorses this opinion. He has discovered a great number of new plants already, of which he will forward specimens to Dr. Muller, and among them are two new fruits.

Mr. Dalrymple and Lieut. Marlow started a few days ago to explore the road to the interior. They were absent four days and discovered a good gap, through which they arrived at the top of the range. The road will probably pass through the range about 20 miles to the southward of the gap, at the heads of the river Mackay, which we discovered on our last expedition, about nine months ago. There are no swamps of any consequence to pass, and the range, though steep, is sound and free from stones. A considerable amount of jungle will have to be cut through, and Mr. Dalrymple will proceed in a few days with a party of seven or eight men to cut a passage. Had poor Kennedy only landed where we did, instead of at Tam O'Shanter's Point, 25 miles to the northward, the lamentable tale of his expedition would never have been written. From the top of a small range near the town we can see the country in which he was struggling for two months, and it appears a succession of lagoons, swamps, and mangrove flats, extending for 20 miles. The scrubs seem to abound with wild bananas; and Mr. Dalrymple, while amongst the ranges, came on some small plains covered with them. Amongst the bananas a great number of wide native tracks reminded him of the approaches to a village in Ceylon. The fruit is now ripe; it is smaller than that of most of the cultivated varieties, and full of seeds, and seems to form a great portion of the food of the blacks.

The blacks are very numerous, both on the mainland and the islands, so much so, that it would be the height of imprudence to let them into the settlement for some time. They came off to the *Policeman* in their canoes, and we also had an interview with them on the mainland, by means of Morrill (the shipwrecked sailor, who had lived among the natives for so many years), and who, though he did not speak exactly the same dialect, was able to understand them. We explained to them that we were come to take possession of a certain portion of the coast, and that they should be undisturbed in the remainder. The fact of occupying their country is at once a declaration of war with the blacks; and as we shall soon be but a very few men in the settlement, it would only lead to great loss of life on both sides to admit them prematurely. They have the largest spears and shields I have yet seen in Australia, and only powerful men could wield such weapons. Lieut. Marlow is a very active and energetic officer, and

has been of the greatest assistance to us; and we must also acknowledge the great courtesy of Mr. Tully, who has given us every aid of his professional knowledge in surveying and choosing the site.

We have now got up a small iron store and temporary tent of saplings and iron, and we are erecting a cottage of timber. I shall be left here for some time with seven or eight men, while Mr. Dalrymple is away exploring the road into the interior; but, I believe, we shall be perfectly safe, as with the blacks it is *omne ignotum pro terribili;* and they will not know our weakness till we obtain reinforcements by sea and land. A number of people are only waiting for a favourable report from us to come up at once from Port Denison: and, I believe, in a few months the settlement will have attained a respectable size.

*Myall Downs, Lynd River.*

The following is an extract from a letter addressed to the editor of the 'Northern Argus':—

After leaving the River Burdekin by the Valley Road, a branch of which crosses the range bounding the Kennedy district, you reach Mr. John M'Kinnon's sheep station on the Lynd River. The sheep here look in first-rate order, and have had capital lambings. I enclose a sample of the wool off their backs, which I think proves beyond all doubt that Northern Queensland can and will produce staple equal to any grown on the famed Darling Downs. We are very fortunate in having plenty of every kind of salt herbs, without which we could not manage.

Mr. Donald M'Donald, from South Australia, has formed a sheep camp west of Mr. M'Kinnon's about sixteen miles, on the Copperfield River, which is a branch of the Lynd. His sheep have been up two months, and look remarkably well. A herd of cattle is now on the road up for this station.

Mr. Colloings, from New England, has a cattle station east of the Lynd River. Messrs. M'Donald and Bell, of Port Denison, have also a fine cattle station on the east bank of the Lynd; they have been up about twelve months, and are in splendid condition. A Mr. Robertson is the manager.

Messrs. G. B. and S. Yeates have formed a sheep and cattle station on the west side of Lynd River, called Myall Downs, junction of the rivers Copperfield and Lynd, at Gilbert Range. This makes the sum total of pioneer squatters in this part of Queensland. Any amount of runs are ready for squatters north and west. Cartage and labour are the present drawbacks. A port at Rockingham Bay or Trinity Bay would open up this country rapidly. At present we look to a township on the Upper Burdekin from

which to get our stores—a second Dalby. Here is an opening for some Maitland carriers to fetch bullock teams over; the carriage is 30*l.* a ton per 100 miles.

The climate is delightfully cool. I send you a table of the thermometer for some days in January and this month. Water, it is said, boils at 209 degrees. This place is 1630 feet above the sea.

| Date. | Thermometer, in Tent Shade. | Wind and Weather. |
|---|---|---|
| January 22 .. .. | 90° | East wind. |
| ,, 23 .. .. | 89° | East wind. |
| ,, 24 .. .. | 98° | No wind. |
| ,, 25 .. .. | 91° | East wind. |
| ,, 26 .. .. | 99° | Thunder clouds. No wind. |
| ,, 27 .. .. | 95° | Ditto showers. Light wind. |
| ,, 28 .. .. | 91° | Sea sends, east wind. |
| ,, 29 .. .. | 87° | Cloudy, heavy east wind. |
| ,, 30 .. .. | 86° | Ditto ditto. |
| ,, 31 .. .. | 84° | Ditto ditto. |
| February 1 .. .. | 76° | Cloudy, S.E wind. |
| ,, 2 .. .. | 80° | Ditto ditto. |
| ,, 3 .. .. | 78° | Ditto ditto S.W. |

On the 30th of January (Saturday), a report reached Yeates' Station that Mr. Donald M'Donald had been murdered by the blacks on the previous Wednesday, and a party was immediately formed to go in search of him, and arrived at his camp about 2 o'clock P.M. the same day. Upon examination we found nothing had been touched. We put Mr. Robertson's black boy Davy on the blacks' trail, whose number appeared to be about seven, and ran it over soft ground on from the camp to the west bank of the Copperfield River, half a mile south from the camp. As the grass had been burnt we could have tracked a mouse. Further on we could see the tracks of boots, which, from the strides, had evidently been running close to the bank, making for the camp. The tracks of the blacks followed, though at some distance from each other. At last we came upon Mr. M'Donald's body lying on its face with a four-pronged spear in the breast and several wounds about his body. Another hundred yards would have saved him by bringing him in sight of his camp; the ravines and intervening brushwood prevented his making a straight course, another cause of his destruction. A hundred yards nearer the camp lay deceased's sheep-dog, speared to the heart. So we read the funeral service over M'Donald, buried him, and fenced the grave in as well as we could. The sheep we found all right; they had not been interfered with.

Statement of Mr. M'Donald's son, a young lad:—"Last

Wednesday my father went after the sheep, and it being a wet morning he took his coat, but left his rifle behind, which he usually took with him. Myself and two sisters and father were the only persons here; have been up now about eight weeks. At about 1 o'clock on Wednesday heard cries and shouting about 400 yards up the river. At first I thought my brother John had arrived with the cattle. Before dark I took a gun and went up to look for father, but saw nothing of him. The sheep came home. On Thursday morning I got up the horses. My sister went out and found our dog speared in the side. We then thought the blacks had killed father, and started for Mr. M'Kinnon's station. Having no road or 'blaze' to our camp, we went a long way out of the proper direction—were out all night. Arrived at M'Kinnon's on Friday afternoon, when four contractors started at once for Mr. Robertson's and Yeates' stations, a distance of 30 miles on the war trail.

"Sunday, January 31st.—Six of the party, including Davy, black boy, recovered part of deceased's greatcoat, a pair of woollen gloves. The hat, a felt one, was not seen in the rebel's camp." Thus ends the report of the first murder in this new district.

*Report of Mr. George Elphinstone Dalrymple, on his Journey from Rockingham Bay to the Valley of Lagoons.*

In a more recent despatch to Mr. Cardwell, dated August 2, 1864, Sir George Bowen communicates the Report of Mr. G. E. Dalrymple on his successful journey into the interior from Rockingham Bay to the Valley of Lagoons,* upon which he writes as follows:—

In continuation of my Despatch of 5th April last, and of previous communications on the same subject, I have now the honour to transmit a very interesting Report from Mr. George Elphinstone Dalrymple,† giving further information respecting the new settlement at Port Hinchinbrook, in Rockingham Bay, which I have caused to be named "Cardwell."

The discovery of a practicable dray road from this excellent harbour into the interior, over the range of mountains which here runs nearly parallel to the coast, is a fact of much importance. Cardwell will at once become the shipping port, not only of the whole district of North Kennedy, but of a large portion of the districts of Cook and Burke, which are being rapidly occupied by our pastoral settlers. The Chief Commissioner of Crown Lands

* For an account of a previous unsuccessful attempt to open a road between these two places, see Mr. Scott's communication in the 'Proceedings of the Royal Geographical Society,' vol. viii. p. 110.

† Brother to Sir James Elphinstone Dalrymple, Bart., M.P. for Portsmouth.

has informed me that our pioneer squatters are already within about 100 miles of the head of the Gulf of Carpentaria, for he has just issued a licence to a gentleman named Henning to occupy the rich open plains on the banks of the river Flinders, surrounding the isolated castle-like hill named "Fort Bowen" by the explorer, Mr. Landsborough. (See Stanford's new map of Australia, published in 1863.)

I requested Commander the Honourable John Carnegie, R.N., to visit the new settlement at Rockingham Bay on his voyage to Cape York in H.M.S. *Salamander*. Regular communication by merchant steamers will be established almost immediately between Cardwell, Brisbane, and Sydney.

I forward an additional copy of the enclosed Report for transmission (with your approval) to the Royal Geographical Society, in continuation of the many valuable papers which that body has already received from Mr. Dalrymple. That gentleman has been mainly instrumental in opening the two new harbours of Port Denison and Cardwell, and in exploring the great district of Kennedy, which embraces an area larger than that of England, the whole of which has been occupied during the last three years by the flocks and herds of our settlers. As myself a Life-Fellow, I hope that the society may elect Mr. Dalrymple to be a Corresponding Member, or may testify in some other appropriate manner its sense of the important services which he has rendered to the cause of geographical research, and of British colonisation.

Brisbane, August 1, 1864.

To His Excellency Sir George Ferguson Bowen, K.G.C.M.G., &c. &c. &c.

SIR,—I do myself the honour to inform your Excellency that I have succeeded in discovering and opening a practicable dray-road from Rockingham Bay to the interior at the Valley of Lagoons, and have, in conjunction with my partner, Mr. A. J. Scott, established a new settlement in connection therewith, on the shores of Port Hinchinbrook, in Rockingham Bay.

Being myself perfectly satisfied of the possibility of finding a road, and being also of opinion that my labours would be much curtailed by the establishment of a safe basis of operations on the seaboard, and by a general view of the whole face of the coast ranges from the entrance to Rockingham Bay—so as to enable me to detect a spot where a pass might with the greatest ease be obtained on to the table-land—we determined to proceed by sea, with a full equipment for the purpose, to form a settlement on these waters, and to endeavour to force a passage thence to the interior.

We therefore chartered at Port Denison the schooner *Policeman* (master and owner, Walter Powell), and on the 12th January,

1864, shipped horses, sheep, stores, materials for building, &c., and prepared for sea.

Our party numbered 20 souls, amongst whom were:—Mr. Arthur J. Scott, Mr. Tully, C.C.L., Lieutenant Marlow (Queensland native police), Mr. Selheim (squatter), Mr. George M. Farquharson (of Invercauld, in Aberdeenshire), Mr. Dallachy (a botanist, sent to accompany me by Dr. Müller, of Melbourne), James Morrill (17 years with the aborigines, as interpreter), J. Morrissey (hotel-keeper), T. F. Milne (storekeeper), Wilhelm Peters (carpenter), Walter Butler, E. Kerr, R. Ewart, &c. &c.

On the 15th of January the *Policeman*, with our small cutter, the *Heather Bell*, of 3 tons, in tow, was at length clear of Port Denison Heads, whence we experienced a most tedious and uncomfortable passage to the northward, having to live on deck under a burning sun, and exposed to heavy squalls of wind and drenching rain, alternating with light and contrary winds; the vessel crowded beyond its capacity with men, horses, and cargo.

On the 18th January, we brought up under the high land of the west side of Cape Cleveland, and went on shore for water and grass, both of which we obtained behind a sandy beach 1½ mile inside the cape, at a spot which I had visited on my expedition in the *Spitfire* in 1860.

A fair wind coming up from the south-east during the night, on the morning of the 19th we passed the Palm Islands on our port beam, and sighted the lofty rugged masses of Hinchinbrook Island to the north-north-west, its summits shrouded in clouds.

As we ran down its eastern side before the fresh south-easter the clouds rose majestically from the extraordinary jagged peaks and pinnacles, which towered high above us to the height of 2500 feet sheer out of the ocean, in bluffs and precipices of grey granite rock—the deep fissures and gorges furrowing their sides right down to the rock-bound shore, lashed by the ever-restless surge of the Pacific, being frequently clothed with picturesque groups of pines (*Araucaria Cookii*), dense scrubs, and forest trees.

Towards the north end of the island, the mountains descend in more regular slopes, clothed with open forest from the sandy beach to their summits; Mount Bowen, Mount Burnett, and Mount Pitt again rising to an elevation of from 2000 to 2300 feet.

Passing rapidly the high rocky headland of Cape Sandwich—which is connected with the mainland of Hinchinbrook Island by a low spit of desert sand-hills—we passed between the long, low, rocky, pine-clad Brook Islands on our starboard side, and the forest-clad peak of Goold Island, 1375 feet in height, on our port beam.

Keeping away westerly, close under the northern declivity—the whole of Rockingham Bay broke suddenly upon our view, backed by its imposing continuous blue lofty ranges of mountains of from 3500 to 4000 feet elevation—rising abruptly from a level forest-clad low country, from which numerous smokes of bush fires of the natives curled upwards into the clear blue sky.

These ranges met the lofty mass of Hinchinbrook to the south-east and eastward, and stretched far away into the northern horizon. The field of our labours was before us; but this unbroken mountain wall seemed to cut off all communication with the interior from the immediate neighbourhood of the port.

We anchored about 1½ mile inside Hecate Point, in 4 fathoms, mud. Some blacks came off in three small bark canoes, two persons in each: but we did not encourage them to come alongside, and they left and went across to Hinchinbrook Island.

On the morning of the 20th we landed opposite our anchorage on the mainland, at the spot reported upon by Captain Richards, of H.M.S. *Hecate*, as being suitable for a town site; but finding the water shoaly for some distance from the beach, and the forest rather dense, we determined to examine the entire shores of the port before deciding upon the precise place for settlement.

We therefore made sail on the schooner and stood down Port Hinchinbrook (which connects Rockingham and Halifax Bays), carrying soundings of from 7 to 12 fathoms for 10 miles to where we anchored.

On the 21st, having found by exploration in the *Heather Bell*, that the whole shores of the passage south of our anchorage were one immense mangrove flat, intersected by saltwater creeks, none of which reach the sound country behind, we weighed and stood up the passage, examining the coast as we proceeded, and were much disappointed in not finding a single spot in the finest part of the harbour which was not either covered or surrounded with mangroves and swamp—until we returned to Captain Richards' site, where we determined to fix our camp at the most open spot at the north-west end of the Two-mile Beach, and off which we anchored.

When coming up the harbour a number of aborigines were seen on a small sandy beach. I therefore went with a party in the ship's boat, with James Morrill, the interpreter. The blacks came out some way into the water to meet us; a number of others lay in wait in the bushes.

They asked for tomakawks, &c., and seemed much astonished that Morrill could converse with them—if not exactly in their own dialect, yet so as to be perfectly understood.

I asked them if there was not a river behind the range (one I had seen on my expedition last year), and where it ran into the sea; but they most positively denied, over and over again, that any

such river existed. I then asked them where the easiest track existed through the ranges, as I wished to go over to the great river, *Maal Maal*, or Burdekin (pointing in that direction), but they stated with much animation that there was no way through the ranges, and that they went far away (pointing to the north-west), and there crossed, and would take me that way themselves! —an arrangement which I did not exactly appreciate, considering the smallness of my party, and the hostility shown by these very blacks to the unfortunate Kennedy and his companions—not to mention that right behind them, and only a few miles off, I saw a splendid gap, by which I had determined to endeavour to penetrate to the interior; and therefore felt perfectly certain that these cunning savages were answering every question by a falsehood for their own purposes.

They were large muscular men, with bullet-shaped heads and a ferocious, cunning, and repulsive cast of features.

Seeing that to admit any of these people to our new settlement would be to allow a multitude of armed savages to have the chance of watching and harassing, and endangering, at any weak moment, a small isolated camp of settlers in a densely wooded country, some of whom would require to be out in the bush splitting and sawing timber without any protection, I told them, through Morrill, that we had come to take possession of the coast from a point on the north-west shore of the bay to a point opposite Haycock Island, and that we were going to settle there and possess it.

They said, "they hoped we were not going to war with them." I replied, "No: that we did not wish to hurt them, but that we wished to be left alone; that if they would keep off and not molest us, we would not injure or interfere with them in any way." They seemed to understand this ultimatum, and retired slowly into the mangroves; Morrill having explained it to them over and over again, and told them to inform the neighbouring tribes accordingly.

I had obtained the services of Morrill from your Excellency's Government for the purpose of, if possible, coming to an amicable understanding with these people, having always been of opinion that hostility and bloodshed frequently occur between the wild blacks and white settlers at the outset of their intercourse, from perfect ignorance on the part of the former as to what the white men require of them—"Thou shalt not steal," and "Thou shalt do no murder," having always required heretofore to be taught them by the rifle and revolver.

It was with great regret that we found it impossible to find a site for settlement on the shores of the inner harbour further to the southward; however, that selected is one of the finest in Australia.

Port Hinchinbrook is a perfectly land-locked harbour of 25 miles in length by 2 in breadth, carrying soundings of from 4 to to 12 fathoms at dead low-water spring-tides, and I feel very confident that an entrance will be discovered from Halifax Bay, close under the high land of Hinchinbrook, through the bar reported to exist there by Captain Blackwood of H.M.S. *Fly*.

Such bars along the north-east coast of Australia are formed by the south-east Trade meeting the currents of rivers or tidal estuaries throwing up banks to windward, but almost invariably with an available channel to the northward, as at the mouths of the Brisbane, Fitzroy, Burdekin, and other minor streams and outlets of the coast.

The lofty peaks of Hinchinbrook on the eastern, and the mountain chain of the mainland on the western side, completely shelter this beautiful harbour from all winds, and render it the most grandly picturesque as well as one of the finest of the Australian ports. It is, in fact, inferior to Sydney only in point of wharfage, vessels unfortunately being unable to approach within a quarter of a mile of any portion of the mainland.

The northern entrance to the port is completely sheltered by Dunk Island, the Family and Goold islands, and banks, through which a broad passage of 3½ fathoms at low-water springs gives easy access from the open sea.

The site for settlement recommended by Captain Richards, R.N., and which we decided upon adopting, is inside and about west-south-west from Hecate Point; and here, during the heaviest weather experienced since our arrival, and during the most stormy season of the year, there has been no break whatever on the beach, and small boats could ply at all times with perfect safety. Although the anchorage for large vessels is some little distance out, yet so soft and even is the flat in front of the town, that they can run right in at high water, and, lying in perfect safety at low water, land cargo on to the beach from the ship's tackles. A jetty, such as is proposed at Port Denison, will in due time quite overcome this difficulty.

The site available for the township extends behind 2 miles of open sandy beach, destitute of mangroves, and slopes gently back for about 2 miles to the base of the mountains, which rise in abrupt and imposing masses behind; and in future years, when the forest shall have fallen, and churches, public buildings, streets, warehouses, &c., spread far along the gleaming shore and back to the base of the mountains, and the taper spars and black hulls of a merchant fleet give life to the now lonely waters of the harbour, Australia will hold nothing more beautiful than the city of Cardwell and its port.

The soil of the town site is a coarse dry gravel, evidently disintegrated granite rock, from the range behind.

The forest is composed of several varieties of *eucalyptus* (gums), *melaleuca* (tea-tree), a large tree called messmate, a kind of stringy bark, and very valuable for building purposes; bloodwood, whitewood, Moreton Bay ash, &c., and some fine large specimens of a description of *ficus*, with dense foliage and white wax-looking flowers, with powerful perfume, which latter trees grow on the beach, their limbs overhanging the sea.

Freshwater is obtained anywhere along the beach by digging, and is of excellent quality. Also in small running creeks, about half a mile from the town, and in a small swamp close to the settlement; and, I should presume, from the elevation and proximity of the ranges, that the supply is permanent.

On the 22nd of January, we landed our horses, sheep, tents, &c., from the *Policeman*, and formed a camp at the west end of the beach; and on the 26th, having, after a careful examination of the locality by land and sea, decided upon the eastern end as the site combining proximity to the best anchorage, the soundest and most healthy ground, and convenient communication with the probable route to the interior, we moved our camp to that place, erected an iron store and huts, landed our cargo, and soon had the satisfaction of seeing forest trees falling in all directions, slabs being split, clearings made, and this silent wilderness of the north awaking suddenly to life and civilisation.

To the westward of the settlement a fine valley runs up about 8 miles into the range, and seeing leading spurs descending at its head into the low country, I proceeded to explore it for a road, accompanied by Lieutenant Marlow (native mounted police), and three troopers.

Passing through rather dense and lofty forest for about 6 miles, we entered a very beautiful tract of rich country, of limited extent, openly timbered ridges descending from the range into small rich plains and forest glades, intersected with many clear running stony streams, all joining a small rapid river (which I have named the Marlow), its banks clothed with dense lofty jungle, a mass of creeping vines, palms, &c. At the head of the valley, where it was surrounded by almost an amphitheatre of precipitous mountains, this river fell from the crest of the range in a fine cascade into the woodlands below.

A broad, hard-beaten path of the blacks led us into this retreat, where small verdant plains, bounded and broken by clumps of vine, jungle, and fig-trees, varied by the fresh, bright green of groves or single trees of the wild banana, and the tall, graceful stems of the *Seaforthia elegans* palm, half completed the delusion

that we were entering one of the beautiful mountain villages of Ceylon or of the islands of the Pacific.

The whole of the open ground of this portion of the floor of the valley was dotted with old and recent "bora" grounds of the blacks, where they hold large meetings of their tribes at certain seasons, at the full moon, to make warriors of the youths, and have fights and "corroborees." Certainly a more beautiful and picturesque site for such wild ceremonies could scarcely be selected.

Over these "bora" grounds the soil was beaten down hard and bare over a space of a quarter of an acre, like an oriental thrashing-floor, and generally surrounded by clusters of small, round-topped huts, covered with *melaleuca* bark. In one of these we found some of the shields and wooden swords of the natives—the former about 3 feet long by $1\frac{1}{2}$ feet broad, and of an oval shape, with a knob in the centre. They are formed of the soft light wood of the buttress root of a description of *ficus*, and are painted in blue, black, red, and yellow bands, in a quaint zigzag pattern, found on all shields in this part of the colony.

The sword is formed of a hard and tough wood, like brigalow. These swords are about 5 feet long and 6 inches broad, and shaped with a curve, and point like an infantry sword. The handle is fined off, and bound with cord and native wax, and is only large enough for one hand; and as they are so heavy that few white men can raise them at arm's length, it is difficult to understand how they can be in any way an efficient weapon in the hands of the Australian savages, unless they are far more powerful men than their more southern brethren, and more so than the generality of white men.

On the 4th of February I ascended the range, and leaving Lieutenant Marlow and trooper Norman outside, with troopers Warbragen and Archy, cut my way up to the summit, through the densest vine and thorn jungle I ever met with, even in the East Indies. Besides an undergrowth of smaller thorny bushes, a perfect network is formed of cane creepers, of various dimensions, covered with hook-shaped thorns, which catch one by the face, back, hands, and legs, so that not only were our clothes nearly torn to ribbons, but we returned to the outside all scratched and bleeding, and our hands and wrists so full of poisonous thorns, that on my return to the settlement I was forced to put both hands in poultices.

From the summit of the range I found that the dense scrub extended for miles to the westward, without a break, and therefore I returned to the settlement, determined to examine the gap to the southward.

On the 10th of February I proceeded with Mr. Arthur Scott

and my black boy Cockey to examine this gap, which is distant 10 miles from the settlement, in a southerly direction.

A blacks' track or path led us right into the gap, crossing many swamps behind the mangroves; but I have since made an excellent road through sound forest country, along the base of the range.

We ascended by easy spurs to a hill above the saddle of this gap, and thence discovered that it descended by a gorge, full of dense scrub, or rather jungle, into the broad valley of the fine river (which I had seen from the western ranges last year, and had questioned the blacks about), and on the opposite or western side of which the main coast range, sweeping back from its lofty abutment on the coast of Halifax Bay, trends away in a west north-west, and, finally, westerly direction, on to the Mount Lang table-land, where by the hills at the head of Great Anthill Creek, Razor-back, Mount Lang, and others, it joins the Great East Australian Cordilleras, where it forms the watershed of the Burdekin and Lynd Rivers.

From the heads of Separation Creek of Leichhardt, a lofty range —in reality a great spur of the main backbone range—sweeps round nearly parallel to the coast range, and sending out a branch (the northern watershed of the Macay River, terminating in Tam O'Shanter Point, inside Dunk Island), the main mass forms the wall-like range of Rockingham Bay, terminating opposite the south entrance of the inner passage, called Port Hinchinbrook, in Mount Leach, a granitic mass of fully 4000 feet elevation.

Between Mount Leach and Mount Arthur Scott (the next most lofty mountain of the chain) is the very peculiar depression or gap which we had ascended—at once solving the difficulty in my mind of overcoming the previously considered impassable Rockingham ranges.

The new river, which I have had the honour of naming the Herbert, after the Colonial Secretary, rises on and traverses the eastern slopes of the table-land; and being precipitated over the edge of the basalt in a heavy fall (which we have heard distinctly 12 miles off) into a deep gorge-like valley between the granitic mountains of the great Rockingham spur and the igneous rocks of the main coast-range and table-land—as these open out towards the coast—winds through the beautiful and rich country of the Vale of Herbert, to all appearances running into Halifax Bay and the south end of Rockingham Channel, and there assisting by its deposits in the formation of the great extent of mud flats and mangrove swamps which cumber this end of the harbour. I am of opinion that the sources of the Herbert are identical with the Separation Creek of Leichhardt—more particularly as for many miles of its upper course it forms the boundary between the primary and

metamorphic rocks; and I could discover no other practicable outlet for Separation Creek through the northern ranges.

On the 15th of February, accompanied by Messrs. G. M. Farquharson and R. Ewart, and two black boys, viz., trooper Norman of the native police, and my own boy Cockey, from Stradbroke Island, Moreton Bay, I left the settlement, with five riding-horses, four spare and pack-horses, rations for fourteen days, arms, and other necessaries.

Keeping close to the base of the range, we traversed ridgy open forest country of messmate, ironbark, bloodwood, gum, and other trees, crossing many running creeks (with vine scrubs, palms, and wild bananas on their banks) running from the range into the harbour, and camped under the north side of Mount Leach, and between it and Port Hinchinbrook.

On the 20th of February we continued our course between the range and the harbour, our passage being impeded by the rocky base of the mountains, furrowed by deep gullies and creeks descending right into the mangrove swamps.

At the south end of Mount Leach we crossed a low scrubby range running out from it, and struck to the W.N.W.

The weather was now and had been for some time very wet, and we had great difficulty in making our way across the swamps which cover the country between Mount Leach and Halifax Bay.

In this locality we discovered a new and very gorgeous plant, about the size and shape of a small pine-apple, but formed of rich deep purple leaves, of the same tint, form, and arrangement as a dahlia—the flower being equally solid, but cylindrical instead of round. It grows upon a cane-like stem, similar to *Vanda cæruliensis*. I could not carry one on this occasion; but doubtless Mr. Dallachy has by this time added this new plant to his valuable collection.

Our route lay about 15 miles along the base of Mount Leach range, the swamps and scrubs hemming us in on the left and encumbering the whole country. On the west side of the range, however, these gave place to extensive rolling plains, with grasses as high as my saddle-bow, but by no means coarse, and the richest red chocolate-coloured loam I have seen in Queensland. These plains extended on both sides of the River Herbert, the banks of which showed 30 to 40 feet of pure mould where cut into by the stream.

We encountered much difficulty and danger in crossing this river, it being broad, rapid, and deep from the flood-waters of the recent rains on the table-land; my horse and Cockey's were rolled over by the stream, obliging us to swim for it. I was also in a position of considerable danger from a tribe of wild blacks, while left alone, with my arms and ammunition wet, on the far side, whilst Cockey was bringing the others across.

I made three separate attempts to cross the main coast range on to the table-land, without success, over a distance of 20 miles along it; but finally crossed it by cutting through a good deal of dense vine scrub, and discovered a good spur descending from the range into the Vale of Herbert, suitable for a dray-road, about 20 miles in a W.N.W. direction from the gap in the Rockingham Bay range, between Mount Leach and Mount Arthur Scott, the country between being open and sound for a dray-road the whole way along the base of the back of the Rockingham range.

That portion of the main coast range which we ascended has a line of perfectly open, bald, grassy summits for about two miles—descending steep, scrubby, and broken into the Vale of Herbert, that river winding far below like a silver snake out of the gorges of its upland birthplace, through mountain-flanked rich woodlands and plains. Further to the eastward it spreads out into the dim distant level seaboard of Halifax Bay, with its faint blue line of ocean, dotted with the hilly outlines of the Palm Island far to the seaward; all softened and mellowed by the gauze-like summer-heat haze of declining day—the setting sunbeams shining deep purple on the distant crenelated peaks of Hinchinbrook, and the chains of mountains north and south. Most grand and lovely in its scenery is this "Vale of Herbert"—mountains, peaks, cliffs, waterfalls, forests, plains, and what is seldom met with in Australian scenery, the clear waters of a broad running river, adding life, light, and beauty to the whole.

To the west a shallow valley full of scrub, bounded by a second line of low bald hills, still cut us off from the table-land, which beyond rolls far away to the westward, until it sinks towards the Gulf of Carpentaria to the north, and to the shed of waters towards Spencer's Gulf to the south and west.

We had to cut our way out through the second scrub, and thence steered W. ½ S. to the Valley of Lagoons.

On the first day we made 20 miles, passing through ridgy, sound, forest country, well grassed and watered, and fit for either sheep or cattle, and crossing the main head of the Burdekin. Coming from the southward, about 12 miles from the range, a more northern head overlaps the River Herbert, behind the north end of Sea View Range. The south head overlaps the heads of the Perry.

On the second day I struck Lucy Creek, the feeder of Lake Lucy, a fine sheet of water, which I discovered last year, a few miles eastward of the junction of Great Anthill Creek with the Burdekin.

A few miles down Lucy Creek it runs through a curious passage or lynn of red conglomerate rock, in which were a few indistinct impressions of fossil-shells.

Following the creek down still west by south for about 10 miles, we came on rich gum and box flats on its banks, and out upon the splendid rich rolling basaltic plains and downs of the Lake Lucy run.

This fine country, the commencement of the rich table-land which extends far to the west of the Clarke, Lynd, Copperfield, Barkly, and Flinders, skirts the shores of Lake Lucy for many miles, and is not surpassed by any down country in Queensland.

The soil is dark, chocolate-coloured, and black, with basaltic stones scattered over it, and small patches of scrub; and, like the remainder of the table-land as described by Leichhardt, "finer sheep and cattle stations for the squatter cannot exist."

On March 1st, crossing the low Psammite range which divides Lake Lucy from the valley of the Burdekin, below Great Anthill Creek, we followed down the valley of that river, with its rich grass, lofty gum-trees, and lotus-covered lagoons, till the hills on either side sweeping backwards, the beautiful open forest-ridges opened out in scattered timber, like an English park, upon the plains and lakes of Leichhardt's Valley of Lagoons.

Herds of short-horned cattle were lying in groups on the woodland ridges, or browsing over the rich pastures with that quiet laziness, sure evidence of their thriving condition—their red and white flecked sides forming a beautiful contrast to the deep green verdure of the country and blue waters of the lakes.

The Burdekin, here a deep swift running stream of about 20 yards broad, winds down the centre of the plains, destitute of river timber, save here and there a dark cluster of *casuarinæ* (swamp oak) on its grassy banks.

Following the plain between the left bank of the river and the Pelican Lakes for about two miles, the Valley of Lagoons cattle-station of Messrs. Scott Brothers, Dalrymple and Co., came in view; the paddock-fence encircling, and the cottage and buildings crowning a commanding ridge half surrounded by the river, and overlooking the whole valley, with its plains, lakes, and wooded hills beyond.

The sheep station is on the basaltic table-land of Leichhardt, about six miles south of Mount Lang; the country being elevated nearly 1000 feet above the Pelican Lakes, and similar in quality to Lake Lucy.

From the centre and most elevated portion of the table-land rises the cone of Mount Lang to an elevation of about 4000 feet above the sea.

It was first ascended by Mr. Arthur Scott and myself last year, and we then found it to be the crater of an extinct volcano, the cup being still quite perfect, of about an acre in extent, and containing the very richest volcanic soil I have ever seen, suggestive

of the possibility of the production of wine-grapes to compete with those of southern Europe.

A large gap is broken out of the south side of the cup, whence, doubtless, poured the three streams of lava, which, as described by Leichhardt, at no distant date have traversed the table-land in distinct lines down into the Valley of Lagoons.

The lava on these streams is heaped up, spiked, jagged, and hollowed out into deep cauldron-shaped holes and fissures, or merely ruffled into gentle wavelets on the surface, as though suddenly cooled but yesterday in its headlong irresistible progress, and occasionally sprinkled with brilliantly-coloured scoria.

It is covered with a variety of scrub bushes, bottle-trees, and, in places, gigantic *eucalypti*, and *casuarinæ*, the latter 4 feet through the butt.

From the summit of Mount Lang the view is far extended and imposing, from the mountains of Rockingham Bay and Hinchinbrook on the east, to the table-top sandstone-hills of the Lynd and the distant table-land of the Flinders, Clarke, and Copperfield to the west; and from the lofty Gilbert and Kirchner ranges to the north, far down the verdant valley of the Burdekin to the southward.

Plains run down from Mount Lang to Great Anthill Creek, and many clear running creeks carry the cold waters of its living springs to the Valley of Lagoons below.

On the 8th of March I started from the station, on my return trip, with the same party and others from the valley, to the number, altogether, of twelve white men and four black boys, three bullock-drays, sixty-one working bullocks, sixty-three fat cattle for the settlement, and eighteen horses. I marked an excellent road to Rockingham Bay by a more direct route than that by which I went up.

We arrived on the crest of the Main Range on the 15th of March, where we camped, and commenced cutting a dray-road through the scrubs, which are very dense and full of thorny vines, "lawyer" palms, and stinging-nettle plants.

We camped here for three weeks, and could not communicate with Rockingham Bay from the flooded state of the River Herbert: the men, however, were hard at work all the time making the road. The latter was at length cleared for three miles, the drays were brought down the range safely, and the passage of the river was at length effected by swimming the bullocks and horses, and dragging the drays over with a rope. Two drays were rolled over by the force of the current, and six of the party who could not swim, and who had gone over on them, had a narrow escape from being washed away. The rest of us rode across stripped, driving the spare horses, bullocks, and fat cattle before us.

From the Herbert crossing, the road traverses the valley of that river in an E.S.E. direction for about 18 miles along the base of the Rockingham Ranges, through open forest ridgy country. There was more difficulty, however, experienced here in crossing the creeks, some of which were scrubby and soft; but good crossings can be made with little trouble.

Here we entered the western side of the singular gorge running up to the saddle of the gap between Mount Leach and Mount Arthur Scott. This gorge, being full of scrub, required another cutting of about two miles, and the sides of the mountains being steep, the road also required to be cut out of the siding for a considerable distance, creeks and gullies filled up with stones, &c.; in fact, a road to be made, not traced and simply cleared of scrub.

The party had now, however, been living for a month on beef and water, without tea, sugar, flour, salt, or tobacco. I therefore decided upon going into the settlement (now only 13 miles off) for supplies and assistance, and having, therefore, cut a bridle-track through the scrub, on Sunday, the 24th April, with Messrs. E. M. Farquharson, Waldron, R. Morris, and Norman and Cockey, black boys, and twenty-six head of fat cattle, we arrived safely at the township, to the mutual delight of the townspeople and ourselves, neither party having heard of the other for two months.

On calling a meeting of the inhabitants, and representing to them that their assistance would open a road at once from the interior into the port, or otherwise I must for the present abandon the enterprise, twenty-six men at once cheerfully volunteered their services and accompanied me to the gap, and under my direction soon cut a good passable road through the scrubs and mountain sidings through the gap, till met by the Valley of Lagoons party from the other side.

The drays were then brought through and into the settlement in safety, and have since returned, crossing the first range with perfect safety, with two tons on each dray. They were also accompanied by spare hands to clear the road and improve the creek crossings for the laden drays.

To the energy of the Rockingham Bay volunteers and our own men the Government of Queensland entirely owes its present possession of a magnificent port, now made available for the commerce of the interior, and of the revenue to be immediately derived therefrom.

I can speak in high terms of the road, and must say that I would rather take my drays across both ranges twice than over Connor's crossing of the Broad Sound range once; and with the expenditure of about 1000*l*., it is capable of being made far superior to the Darling Downs ranges.

The distance from the Valley of Lagoons to the settlement, by

the road, is 96 miles; thence roads branch off to the Flinders, Lynd, Clarke, Barkly, and down the Burdekin Valley to Port Denison; and in a short time the route by the Flinders will be extended to a new settlement on the shores of the Gulf of Carpentaria, connecting the Pacific and the Gulf by a road only about 350 miles long.

By this journey I have had the gratification of connecting the tracks of Kennedy with those of Leichhardt and Gregory, thus filling up the only missing link of exploration between Cape Otway and Cape York on the one hand, and Western Australia with the same point on the other; these being again united in various directions by the tracks of McKinlay, Walker, Landsborough, and McDouall Stuart.

Stations have already spread down the Flinders by this route to within 100 miles of the Gulf, and will soon, by reaching its shores, give protection to the telegraphic line to India *viâ* Timor and Java, inaugurated under your Excellency's Government, and now rapidly progressing northwards.

The upland table-lands behind Rockingham Bay are of great extent, and afford millions of acres of the finest country for the growth of wool.

The scrubs of the ranges, and the rich alluvial flats of the Vale of Herbert, and the valleys penetrating the coast ranges, are undoubtedly the best suited for the growth of sugar, cotton, and coffee in Queensland; and as the site of the town itself is unexceptionable, and the harbour, as before stated, only second to Port Jackson, I can confidently predict a brilliant future for the town of Cardwell and Port Hinchinbrook; my statements concerning the latter, your Excellency, having visited it in H.M.S.S. *Pioneer*, being in a position, I trust, to endorse.

At present there are about 25 houses in the port, and about 50 people; but the report of the success of our enterprise will soon send numbers to swell the population.

The shipping to the port is at present necessarily limited to a small schooner, but the Australian Steam Navigation Company have proposed liberally to pioneer the way to Port Hinchinbrook with a small steamer; and from the position of this port in the centre of the long north-eastern coast of Queensland, and its capabilities as an Admiralty and mercantile steam coaling depôt, I trust, ere many years have passed, to see the ocean-going steamships of a mail line from Brisbane to Singapore, *viâ* Torres Straits and the splendid inner passage so highly commended by the late Admiral King, and many succeeding eminent naval authorities, making Cardwell a place of regular call; converting it from being, as lately, a wild, desolate, and remote spot, into a flourishing seaport, within easy communication with the marts of the world.

XVII.—*Djungaria and the Celestial Mountains.* By P. P. SEMENOF; *being the Preface to the Second Volume of his Russian Translation of* RITTER'S '*Erdkunde von Asien.*' Translated from the Russian, for the Royal Geographical Society, by JOHN MICHELL, Esq.*

THE Second Volume of the Russian Translation of Ritter's 'Asia' comprises a description of the north-western portion of the highland of Asia, *i.e.*, that extensive region which stretches between the Altai and the Celestial Mountains, from the eastern extremity of the latter at Kami (Komul) to the watershed of Lake Balkhash, and contains also a history of the exploration and settlement of Siberia.

The range of country under consideration embraces the whole of the extinct kingdom of Djungaria, or the Chinese province of Tian-Shanbey-Lu (the region to the northward of the Celestial Mountains, consisting of the districts of Ili, Tarbagatai, Gobdo, &c.), and likewise the Russian districts of Alatavsk, Kopal, and Ayaguy, which now constitute the new Semipalatinsk region. The whole of this country, including, that is to say, both Chinese and Russian Djungaria, forms that most obscure and unknown portion of the interior of Asia which contains within it the very centre of the Asiatic continent, namely, the gigantic mountain-group of the Tengri-Tag (a part of the Celestial Mountains), situated at equal distances from the Black Sea on the west, and the Yellow Sea on the east, the Obi Bight on the north, and the Bay of Bengal on the south, and lying in the centre of the straight line connecting Cape Severovostochi, in Siberia, with Cape Comorin, in India.

This region offers, moreover, special interest in physical as well as in ethnographico-historical respects. Physically, it forms a distinct limit between the highland and the depressed portion of Asia, and is remarkable for the contrast it presents between its gigantic mountain-groups of the Bogdo and Tengri-Tag in the Celestial range, which tower far above the limits of eternal snows, and are crowned with large Alpine glaciers, and the low sandy and sterile steppe of the Bedpak-Dala, on the south-west of Lake Balkhash, which bears the character, in common with the other sandy wastes of the Aralo-Caspian depression, of a bed of an inland sea dried up during a very recent geological period. In ethnographical respects this region offers a contrast no less marked between two numerically-preponderating Central Asiatic races—the Mongolian and Turkish—whose rulers are strangers from the far East and West—Chinese and Russians—occupying in the same fluvial plain of the Balkhash small populated oases in the midst of an indigenous population, alien in speech and habits

* See map in 'Journal,' vol. xxxi. p. 356.

to their dominating rulers, who are powerful, not by reason of their numerical superiority, but by the weight of their civilization, and the magnitude of their respective empires—the most colossal on the face of the globe. Lastly, from an historical point of view this country presents features of a no less interesting character. It has served from time immemorial as the point of departure for migrating races from the highlands of Asia, the cradle from whence they spring, to the low and arid steppes of the Aralo-Caspian depression, and to the still more distant and better-favoured regions of the west. It was here, namely, in Djungaria and the fertile and smiling banks of the Ili and Irtysh, that the migrating hordes lingered for some time, loth, as it were, to venture out into the unknown plain before them, stretching far away in the sandy ocean that separates Europe from Asia, until a new tide of popular migration forced them at last to strike their tents and depart westwards from their mountainous halting-grounds. It is here also, in the valleys of Djungaria, that a few existing rude monuments, crude traditions, geographical names and remnants of tribes, who in many cases have lost their native dialect by having intermixed with other races (the result of which appears in the name of Kassak or Kirgjiz Kaisak), serve the scientific explorer as the only links for identifying the obscure and fragmentary allusions concerning these migrated hordes, which occur in Chinese and Russian chronicles.

Although the physical and ethnographical characteristics of Inner Asia have attracted the constant attention of some of the most learned men, such as Humboldt, Ritter, Abel Remusat, and Klaproth, the researches of these leaders of science could only be based on the most meagre data, namely, on the dry and one-sided Chinese narratives which found a place in Chinese literature from the period of the dismemberment of the Djungarian kingdom, in the middle of the last century, and also on the inaccurate, brief, and conflicting accounts and itineraries of a few Asiatics who succeeded in visiting Djungaria and Little Bukhara with caravans. All these materials were collected and carefully collated by Ritter and Humboldt; nevertheless, this region remained, like the interior of Africa, up to the most recent period, completely inaccessible to European science.

Even Marco Polo, the most enterprising and reliable traveller of the middle ages, did not visit this region, but proceeded eastwards to China, by a route that lay southward of the Celestial range. A few other travellers, it is true, passed through Djungaria; these were: Plano Carpini (1246), André Longjumel (1249), and Wilhelm Rubriquis (1252), and they probably journeyed by way of Lake Zaisan to Karakorum, the capital of the Mongol Khans.

The same route was traversed by some of the subjugated

western princes, such as Yaroslaf and Alexander Nevski of Russia, and Getum of Armenia (likewise in the middle of the thirteenth century), for the purpose of paying homage to the great Khan; they, however, either left no description of their journeys, or else their accounts are so meagre and confused—as, for instance, the narrative of Prince Getum—that very few of the places mentioned in them can be identified. Much later, Fëdor Tsakovitch Baikoff, the envoy of the Russian Tsar Aleksei Fëdorovitch, proceeded in 1654 past Lake Zaisan and the upper course of the Black Irtysh, and traversed the whole of Djungaria, reaching the Chinese wall at Huhu-Hotan, from whence he advanced to Pekin. Although Baikoff's march-route (of course not in the form it is inserted in Witson's work, from which it was derived by Ritter, but in the shape we find it in Spasoke's 'Sibirski Vestnik') can, in the present state of our knowledge of the geography of Central Asia, be pretty readily applied to certain localities, still the information it contains is of too meagre a character, and is greatly inferior to native Chinese accounts. The southern border of the country now under consideration, *i. e.*, the gigantic Celestial range, has not been explored by any European traveller up to the present day. The destruction, however, of the kingdom of Djungaria by the Chinese led to its being surveyed under the superintendence of the European missionaries, Felix D'Arocha and Hallerstein, by whom astronomical points were determined, not alone in the towns of Djungaria and Little Bukhara, but also at the very foot of the Celestial range, as at Hangor-Ozen, the modern Konur-Ulen, and on the southern shore of Lake Issyk-kul. As the Jesuits have left no record whatever of their having visited any part of the Celestial range, it must be naturally concluded that they themselves did not diverge from the high roads of Central Asia, but detached a party of Chinese topographers, instructed by them, to the base of the Celestial Mountains.

The first learned Russian traveller who penetrated into the part of Inner Asia now under consideration, was the botanist Sivers, who in his hazardous and venturesome journey to the Tarbagatai in 1793, advanced as far as 47° N. lat. During the succeeding forty years not one of the scientific explorers of Western Siberia succeeded in advancing beyond the point previously reached by Sivers. The journey of K. A. Meyer, in 1826, did not extend beyond the Arkat Mountains, Chingiztàn, and the Karkara district of the Kirghiz Steppe; the travels of Humboldt and his associates, in 1828, did not embrace even Djungaria; their utmost limit was the Chinese picket of Baty on the Irtysh, in 49° N. lat.; and Humboldt's greatest service in connexion with the geography of the interior of Asia consists in the critical elabora-

tion of the materials relating to this subject in his classical 'Asie Centrale.'

Some of these materials, namely, the itineraries of Asiatic traders who had visited different parts of Asia with caravans, were diligently collected at Semipalatinsk by Humboldt; and another portion of his materials was derived from Chinese sources that had been elaborated by the European sinologists, Abel Remusat, Klaproth, Schott, Neumann, St. Julien, Father Hyacinth, &c.

Among the few unscientific eye-witnesses who in the pursuit of trade penetrated into Inner Asia, were some Russians; and among these, in point of lucidity and accuracy of information collected, the first place is undoubtedly occupied by the interpreter Putinsef, who in 1811 visited Kuldja and Chuguchak, the most flourishing towns of Djungaria. The narrative of this journey was published in the 'Siberski Vestnik,' translated by Klaproth, and served Ritter as one of the most valuable sources in elucidating the geography of this region. In addition to Putinsef, we may mention the miner Snegiref, who, towards the end of the last century, proceeded from the Altai to the neighbourhood of Chuguchak, in search of gold; and the noble Madatof, who, in the early part of the present century, successfully reached India, starting from Semipalatinsk, and traversing Lake Issyk-kul, the Celestial Mountains, and Little Bukhara. A short account of Snegiref's journey was printed in the 'Siberski Vestnik;' but with Madatof's expedition, I am acquainted only through official documents preserved in the archives at Omsk, and as no original narrative was discovered by me, it must be presumed that none ever existed. I also found a short march-route at Semipalatinsk, drawn up by the merchant Bubeninof, who in 1821 proceeded from Semipalatinsk to Kashgar. This itinerary will be printed in due season; but, from its brevity and scantiness of information, it is in no respect more valuable than the itineraries already printed and digested by Humboldt and Ritter.

Such was the unsatisfactory condition of our knowledge of the geography of Central Asia in 1831, at the time of the appearance of that part of Ritter's work which relates to it. It was only in the fourth decade of the present century that we became more familiar with Inner Asia from the side of the Djungarian and Kirghiz Steppes, that is to say, with the foundation of the Russian town of Ayaguz, on the upper course of one of the rivers of the Balkhash basin, and after the submission of a portion of the great horde under Sultan Seek, son of Albai Khan. These events gradually rendered, not alone Lake Balkhash, but also the mountainous districts of Djungaria, more accessible to travellers. In 1834 the astronomer Federof was enabled to reach the em-

bouchure of the Lepsa, and determined its geographical position under 46° 2½′ N. lat. He also succeeded in visiting the southern shore of Lake Zaisan, and in making a trigonometrical measurement of Tarbagatai. A little later the relations of Russia with the Kirghiz Hordes became more satisfactory, and in 1840, 1841, and 1842, the learned travellers Karelin and Schrenk penetrated into the mountainous portions of Djungaria, or the snow-clad Djungarian Alatau. Karelin explored the wild valleys of the upper courses of the Lepsa, Sarkan, and Baskan rivers, as high as the snow-line. Alexander Schrenk visited, and it may be said discovered to science, the Lake Ala-kul, crossed over the Djungarian Alatau to the Chinese side, attained the upper course of the Tentek, and reached the snow-line on several occasions. The extreme limit of his journey on the plain bordering Lake Ala-kul was the Chinese town of Chuguchak, in Alpine Djungaria, the hills skirting the banks of the Koksu River, and in the hungry Betpak-Dala Desert, south-west of Lake Balkhash, the River Chu.

Subsequently, the voluntary submission of the remaining portion of the so-called Great Kirghiz Horde in 1844, led to the Russian occupation of that rich and fertile portion of Djungaria which is known under the name of the Semipalatinsk region, from the seven tributaries of the Balkhash that water it. The Russian town of Kopal was founded by Governor-General Prince Gorchakof, in 1846, on a fertile plateau at the base of a snow-capped spur of the Djungarian Alatau. The establishment of this town ensured the development of the already existing relations of Russia with the neighbouring Chinese province of Ili. Although rapidly increasing, the trade with the western Chinese region through the towns of Kuldja, and more especially Chuguchak, encountered obstacles in its legitimate development from its transitive and contraband character, as the Chinese of the western region (Si-Yui) were only able to have secret dealings with the Russians under a semblance of trafficking with the Kirghizes. It was this disadvantageous state of things that led to the mission, with objects partly diplomatic and partly geological, of E. P. Kovalefski, accompanied by Vlangagli, an officer of Mining Engineers.

This expedition started from Kuldja, and skirting the Russian side of the Djungarian Alatau, reached the valley of the Koksu, as far as the upper sources of this river, while on the Chinese side it reached the town of Kuldja on the Ili. The most important result of this mission in commercial as well as in scientific respects, was the establishment of Russian trading-factories at Kuldja and Chuguchak. The opening up of the western Chinese region contributed largely to the increase of our knowledge of the geography of Asia, inasmuch as it threw two learned Chinese

scholars in the capacity of consuls into the commercial centres of Djungaria. The local researches of these sinologists opened a wide field to science. Mr. Zakharof, one of the consuls, has already collected materials of great value relating to the physical geography and cartography of Inner Asia. These materials he has obtained during his stay at Pekin, from rare geographical works (namely, the reports of the survey made during the reign of Tsian-Sun), and from information supplied him by natives of the western region.

The foundation of the town of Kopal, which was in a satisfactory and flourishing condition, owing to the rapid development of agriculture, aided by artificial irrigation, could not, however, secure the Great Horde, now under Russian dominion, against the bold attacks of the Buruts, or the so-called Black or Dikokamenni Kirghizes who infested the valley of Lake Issyk-kul and the neighbourhood of the sources of the Ili (Tekes). This was naturally to be expected from the position of Kopal, which stood on the northern confines of the Horde, whose southern boundary beyond the Ili remained completely unprotected. The unguarded condition of the frontier of the Russian empire induced Governor-General Hasford to occupy the so-called Trans-Ili country extending between the River Ili and the snow-line of the gigantic Trans-Ili Alataù, with a view of securing the left flank of the Kirghiz Steppe, which was under Russian protection, by making it conterminous with the peaceful frontier of China and the natural snowy-mountain boundary. This well-conceived plan was carried out with complete success. In 1853 the first Russian detachment, under the command of Colonel Gutkofski, was despatched beyond the Ili: it, however, met with serious opposition from a strong body of Kirghizes belonging to the hostile tribes of the Great Horde who rested on Fort Tuchubek, on the River Kesken. But in the following year the whole of the region was occupied by a force under Lieut.-Colonel Peremyshelski, who razed the Kirghiz fort to the ground. After this some of the tribes submitted to Russia, while the most inimical fled into Kokanian territory, and to the banks of the Talas and Syr-Daria. The Russian detachment passed the winter in the sheltered valley of the Talgar; and the ensuing year of 1855, General Hasford founded Fort Vernoé, at the base of the Trans-Ili Alataù, at the head of the Almatynka valley, which is picturesquely wooded with apple and apricot-trees.

The occupation of the fertile Trans-Ili region, well adapted for agricultural and gardening purposes, and in all respects beautifully endowed by nature, had the effect of protecting the Great Horde from the attacks of the Buruts, but placed its nearest tribes in the same position as that occupied ten years previously by the Great

Kirghiz Horde. The powerful and numerous tribe of the Bogus, who occupied the picturesque valleys and the table-land between the Celestial Mountains and the Trans-Ili Alatau, received neither countenance nor support from the Chinese, on whom they were nominally dependent, in resisting the fierce attacks of the Sary Bagish tribe, and had at the same time to repel on another quarter the depredatory incursions of some of their neighbours of the Great Horde. Consequently, soon after the occupation of the Trans-Ili region by the Russians, the high Manap of the Bogu tribe, the old Burambai, claimed the assistance of General Hasford against the attacks of the neighbouring tribes, and voluntarily tendered the submission of himself and his tribe to Russian government. This led to the despatch of the first Russian detachment from Vernoé to Lake Issyk-kul, for the purpose of pacifying the two contending tribes, and making a reconnaissance of the hitherto unexplored valley of Lake Issyk-kul. Colonel Khomentofski, the officer in command of this force, and General Silverhelm, who conducted the survey of the newly-organised Semipalatinsk region, were the first educated Russians who beheld this extensive lake and the snowy summits of the Celestial range. Unfortunately, this detachment, in consequence of its critical position amidst the marauding mountain tribes, the animosity of one of which against the Russians was decided, while the friendliness of the other was open to much suspicion, was soon recalled, and the surveying parties were unable to penetrate into the interior of the Celestial mountains. The southernmost point attained at the foot of the Tian Shan, by Ensign Yanovski, the topographer attached to the expedition, was where the Zaùkù rushes out of its narrow defile on the Issyk-kul plateau.

In the same year of 1856 I was sent by the Imperial Russian Geographical Society on an expedition to explore those more accessible portions of Inner Asia which had previously been little visited. Naturally, the great object of attraction for me on this journey was the Tian-Shan or Celestial range. The signification of this stupendous chain, in position the most remote in the whole continent of Asia, although pointed out by Ritter and Humboldt, had not, until then, been investigated by any scientific traveller.* All the learned and critical researches of Ritter

* Atkinson, the English artist, in his travels which were published in 1858, gives an account of his journey from the River Kunchun, in the southern Altai, across the Black Irtysh, to Lake Ubsa-nór; thence southwards past Ulusutai to the neighbourhood of the Chinese town of Barkul, at the base of the Tian-Shan, travelling then parallel with this chain, though at a considerable distance from it, as far as the meridian of Bogdo-Ola Mountain, finally proceeding in a north-westerly direction past Lake Kyzyl-Bash, and reaching Lake Ala-kul in Russian territory. Unfortunately so extraordinary a journey, unprecedented in the history of the exploration of the Asiatic continent, has had no beneficial scientific results.

and Humboldt respecting this range, belonged only, even by the admission of the latter, to conjectural geography; or, otherwise, were founded on a comparison of the obscure and con-

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The narrative, which occupies 115 pages of text, characterises the explored region so little that it might with equal fitness be applied to any portion of the Kirghiz Steppe. The critical inquirer finds nothing throughout the whole narrative to convince him of the genuineness of the described journey, which extends over no less than 3000 miles of Chinese territory. This is the more striking as undoubted proofs of the actual performance of journeys of which descriptions have been given may easily be found in the short itineraries and accounts of travels of different ages and nations; as, for instance, in the travels of Huc and Gabet, in the march-routes of Tartar traders collected by Humboldt, and in the more ancient accounts of Baikof, Marco-Polo, the Armenian Prince Getum, in the march-route of the army of Gulagu-Khan (compiled by one of his officers in the thirteenth century, and lastly, in the narrative of the travels of the Buddhist missionaries Fa-Hian and Huan-Tsian in the fourth and seventh centuries. Concise though these accounts doubtless are, the learned critic soon discovers in them such local peculiarities as can only be descriptive of particular spots and localities; and as we become more intimate with the geography of the country to which such accounts apply, the more readily and clearly do we identify the points given in the march-routes. To our great regret we do not find this to be the case in that part of Atkinson's work which relates to Chinese Djungaria. From the commencement, in calling the Sian-Shan Sayan-Shan, he confounds, in name at least, the two principal mountain systems of Inner Asia; and in all the other portions of his narrative, where he does not confine himself to descriptions of the steppes, the chase of wild animals, yurts and social customs of the nomads (descriptions which would apply with equal force and truth to the whole of Central Asia), but wishes to communicate something more definite and locally characteristic, he falls into numerous incongruities. Thus, to cite some examples, he speaks of the Kara-Tyn snowy range, at the upper course of the Black Irtysh, as of a level steppe, intersected by low ridges; again, from the Tannu Mountains, situated at a distance of 120 miles to the north-east of Ubsa-Nór, he sees the Bogdo-Ola, in the Tian-Shan, which is about 750 miles away from this point. Lastly, from the plain at the base of the Celestial range he simultaneously sees not only the Bogdo Mountain, but also the Baishan (Pé-shan)—emitting smoke, by Atkinson's account—which is about 300 miles beyond to the westward, notwithstanding that the snowy Bogdo-Ola group stands out, as is well known, considerably in advance of the main chain of the Celestial Mountains, and the Baishan Mountain rises on their southern slope, that is to say, beyond its gigantic snowy ridge, in the neighbourhood of the little Bukharian town of Kuchà. Similarly, as little confidence do those inconsistencies inspire which occur in the account of the time occupied in performing the various journeys and those which relate to the distribution of the nomad Kirghiz population throughout Chinese Djungaria. As regards ourselves personally, the involuntary doubts respecting the above-mentioned portion of Atkinson's travels are still further strengthened from information we gathered on the spot regarding his journeys from the Cossacks who accompanied him, and from the commanders who provided him with escorts. Atkinson, during his many years' residence in Siberia, visited the neighbourhood of Kopal (which had then just been founded), many valleys of the Djungarian Alatau, the lake Ala-kul, Tarbagatai, the rivers Narym and Kurchum, in the southern Altai, the Teletsk Lake, Tunkinsk Mountains of the Syan Range, Irkutsk, Kiakhta, &c; but as regards his travels over an extent of more than 4000 versts in Chinese territory, *accompanied by three narym, or kurchum cossacks*, I regret to say that I not only could not gather anything to confirm this fact, but even became convinced of its utter impossibility from existing local conditions on the Russian as well as on the Chinese side. On the Russian, because the protracted detachment of three Cossacks, or their voluntary absence from the corps, is a fact that would leave behind it some record in the official archives; while on the Chinese side, the journey, lasting more than six months, of a party, unacquainted

fused narratives and descriptions of Chinese and other Asiatic travellers, commencing from the Buddhist missionaries Fa-Hian and Huyan-Tsian, of the fourth and seventh centuries, to the brief itineraries of the Semipalatinsk Tartar traders of this century. Numerous questions, replete with interest to the science of geography, could only be possibly solved by actual investigation on the spot. The configuration of the country, the direction of the upheaval of the mountain chain, its mean height or the altitude of its mountain passes, the height of the snow-line, distribution of animal and vegetable organisms in this unknown mountain region, the existence of Alpine glaciers or of volcanic action—all these were points requiring either investigation or confirmation.

So far back as 1851 and 1852, during my stay at Berlin, I acquainted Humboldt and Ritter with my intention of proceeding into the interior of Asia as far as the Tian-Shan range. They both encouraged me in my difficult enterprise, but did not conceal their doubts as to the possibility of penetrating so far into the interior of the Asiatic continent. The result of my deliberations with these leaders of science was to strengthen me in my determination of attempting to reach the eternal snows of the Tian-Shan at all hazards. Humboldt attached so much importance to the investigation, even a cursory one, of this range, that I could not look at the undertaking except in the light of a holy mission marked out for me by the Nestor of European men of science.

By the end of the summer of 1856, under the auspices and with the assistance of the Russian Geographical Society, I was already in Vernoé; unfortunately, however, I arrived two months after the visit of a Russian detachment to Lake Issyk-kul.

With a small escort of twelve Cossacks I succeeded, on the 21st September in reaching the eastern extremity of the lake, and had an opportunity of surveying, from Kuké-Kulusun point, the imposing range of the Tian-Shan from the Dirgalan to the opposite extremity of the lake. To visit the chain itself was at that moment impossible. My escort being so small, I was obliged to proceed very carefully, and passed the nights in inaccessible defiles, anticipating every moment to be attacked by hostile bands of Kara-Kirghizes.

Returning to Vernoé, and procuring a larger escort (forty Cossacks), I proceeded through the wild Búam defile at the upper

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with the local dialect and passing through inhabited districts, along established routes and across the picket and frontier lines, could scarcely escape the vigilant eyes of the Chinese authorities. Under all these circumstances combined, and in the absence in Atkinson's narrative of any new data relating to Chinese Djungaria, this work cannot be considered as an acquisition to science until the author adduces more definite information and stronger proofs in corroboration of his accounts, that involuntarily inspire certain mistrust.

course of the Chù, and emerged on the base of the Celestial range, near the western extremity of the Lake Issyk-kul. Here I came upon numerous encampments of the hostile Sary-Bagysh tribe, who shortly before my arrival had had a fierce engagement with a Russian detachment which had been sent out from Vernoé to punish these mountaineers for acts of violence and plunder.

Notwithstanding the hospitable reception of the Sary-Bagyshes, who were commemorating the death of many of their kinsmen that had fallen in the recent conflict, I was not able to penetrate beyond the first exposed rocky spurs of the Celestial range, and to visit its wild defiles, being apprehensive of treachery from the revengeful mountaineers who had lately been so severely punished by the Russians.

However, in the spring of 1857—thanks to the escort kindly furnished me by Governor-General Hasford, who displayed great zeal and energy in the organisation and exploration of the newly-acquired region—I was enabled to realise all my plans. The deadly strife between the two Kara-Kirghiz tribes was then at its height, and the valleys of the Tian-Shan seemed quite inaccessible; a happy combination of circumstances, however, removed this apparently insurmountable obstacle to my journey. A rumour, that spread with extraordinary rapidity through almost the whole of the Mustag (the Turk name for the western portion of the Tian-Shan), of the approach of a strong Russian detachment, armed with terrible instruments of destruction,* for the purpose of assisting the Manap Burambai, produced a sudden panic among the Sary-Bagysh tribe, inducing them to relinquish, not only the camping-grounds they had seized from the Bogus, but even their own native pasturages, from the upper course of the Dirgalan, along the whole border of Issyk-kul, for an extent of more than 200 versts, and to migrate to the upper course of the Syr-Daria (Narym). The Bogu tribe, who had been furiously attacked by the Bagyshes in the spring of 1857, and driven into Chinese limits, expected complete destruction; the sudden flight of their enemies dispelled their fears, and enabled them to reoccupy their former camping-grounds, and even to reap the harvest that had been left standing in the fields by the Sary-Bagyshes. Attributing this favourable turn in their affairs to my approach, they rendered me every assistance in the object of my journey. With such material assistance I was able, in July of 1857, to make a *détour* of Issyk-kul from the south side, and to reach the summit of the

* The exaggerated accounts respecting the strength of my escort was owing to my having really reached Barambais aüls accompanied by 800 horsemen: but these consisted of a body of Kirghizes of the Great Horde under the Sultan Teyek, who had voluntarily joined my detachment. My own personal escort consisted only of 25 Cossaks.

imposing and terrible Zaùkù-Davan mountain-pass. I also succeeded in gaining the sources of the Narym, which belongs to the system of the Syr-Daria or Jaxártes. Shortly after I penetrated, on a more easterly meridian, much farther into the heart of the Celestial range, and ascended one of the most elevated mountain-groups of Inner Asia, that of the Tengri-Tag, which is crowned with a circle of Alpine glaciers, and covered with a dazzling mantle of eternal snows. In the glaciers of the Tengri-Tag I discovered the sources of the Sary-Djaza, which belongs to the system of the Taryn-Gol or Ergeù, the most remote of the considerable rivers of the Asiatic continent.

On my return to St. Petersburg in 1858, the Imperial Russian Geographical Society, taking into consideration the great want of astronomical points in the region visited by me, organised, at my recommendation, and with the co-operation of the Military Topographical Depôt, a new expedition under Captain Golubef, for the purpose of determining astronomical points in Russian Djungaria and on the Lake Issyk-kul. By last accounts Golubef had ascertained the position of three points in the valley of Issyk-kul Lake (on the Tekes River, and at the eastern and western extremities of the lake respectively), but had not succeeded in penetrating into the interior of the Tian-Shan, owing to adverse circumstances, and to the southern shore of the Lake of Issyk-kul being occupied by the hostile Sary-Bagysh tribe. Under such a state of things it would of course, have been extremely rash to advance into the mountains, having hostile tribes in his rear.

All the journeys and researches since the year 1834, enumerated above, have considerably advanced our knowledge of the portion of Asia which we are now considering, and have removed it from the region of hypothetical speculation to a certain basis of scientific investigation. On this account, therefore, the second volume of the Russian version of Ritter's 'Asia' ought to be accompanied by copious and trustworthy annotations.

Unfortunately all the additional materials for these additional notes are but little digested as yet. The travels of Fëdorof, Karelin, Schrenk, my own, the observations of Golubef, the data collected and elaborated by Zakharof, have not yet appeared in print, and only short notices of them have been presented. I am consequently necessarily obliged to withhold the supplementary matter to the second volume, at all events until the publication of my travels, which is now delayed on account of all my time and attention being engaged on questions of pressing and vital importance to Russia.

With regard to the third volume of the Russian edition of Ritter's 'Asia,' containing a description of the Russian Altai, the not-unimportant materials relating to these mountains which were

collected by me on my journey have been partly digested since my return; and I am therefore in a position to proceed at once with the publication of this volume with its supplementary portion.

In conclusion to this preface, I think it necessary to allude briefly to some of the general results of my visit to the Celestial mountains.

The results embrace three questions of the utmost importance to the geography of Asia, namely: *a*, the height of the snow-line in the Celestial range; *b*, the existence of Alpine glaciers; and *c*, the existence of any volcanic phenomena in this region.

On the first of these points I consider it incumbent on myself to dwell at length, in reply to the doubts expressed by Humboldt as to the correctness of the elevation of the snow-line in the Celestial range, as determined by me. The height I fixed it at, namely, 11,000 to 11,500 feet, was ascertained by Humboldt from a letter I wrote to Ritter, and which attracted his particular notice. This letter was published in the 'Zeitschrift für Erdkunde," with some explanatory remarks by Humboldt. The method I adopted for ascertaining the height of the snow-line was not known to Humboldt, who grounded his supposition of an over-estimation of the elevation of the snow-line on certain theoretical or comparative considerations.

Inaccuracies in the determination of the height of the snow-line may arise from two sources: 1stly, from what is taken to be the snow-line; and 2ndly, from an imperfect method of measuring heights.

In the first instance the observer may be deceived by either taking dissolvable for eternal snows, or fixing their limit of height in sheltered ravines or defiles which are hardly reached by the rays of the sun. Had I fallen into these errors in my determination, the result would have been to lower instead of to raise the height of the snow-line, as compared to its true limits. But these sources of error were fully anticipated and averted by me, as my observations were made at points where regular layers of eternal snow occurred, and moreover on mountain-ridges, and not in hollow depressions, in some of which I really did find eternal snows, in some cases several hundred feet below the limit of 11,000.

With regard to the other point, I must observe that the method employed by me in determining heights by the temperature of boiling water is certainly one which is far from being perfect, and which can lead only to approximate results; but the inaccuracy of these results becomes more inappreciable, the greater is the height which is being measured. For inconsiderable elevations this method of measurement cannot be adopted. I may, however, also observe that the other method, namely, that of barometrical determination, can scarcely be expected to give more accurate results

under certain unfavourable conditions, as, for instance, on a journey through an extremely wild and dangerous region, where the traveller is obliged to form his own track, and stands every moment in danger of an attack. Under such circumstances all simultaneous observations of the barometer, at the base and summit of mountains, at fixed stations, or a series of observations at one point, are quite out of the question. Experience has also shown me the complete impossibility of keeping the barometers (I had two with me) from breaking in a country so mountainous as that I traversed, where on each expedition the pack-horses and camels stumbled repeatedly, and were occasionally dashed to pieces by falling over precipices. Hence travellers (Humboldt amongst the rest, on his famous journey in the Andes and the Cordilleras) have invariably had recourse to the method of determining heights by the temperature of boiling water. The results obtained in this manner are regarded by science merely as approximations until they are superseded by more accurate data obtained when the region is more accessible to scientific exploration. Although incomplete, these results are nevertheless of undoubted value to science, as the magnitude of probable errors under such an imperfect method cannot exceed certain limits.

But Humboldt could not have taken exception more especially to the method used in measuring the height of the snow-line in the Tian-Shan, because firstly, he at that time did not know what means were used for this purpose; and secondly, because he himself adopted the same method on his journey in the New World, which was so prolific of scientific results. Humboldt's doubts respecting the probability of the Tian-Shan snow-line being so elevated as I had fixed it to be, were based on considerations of comparative geography, and their soundness or otherwise may be easily tested on account of their being founded on a comparison of the height of the snow-line of 11,000—11,500 feet with its well-ascertained limits in nearly the same meridian (in the Altai 6,600 feet), or in the same parallel (the Pyrenees 8400 feet, and the Caucasus 10,170 feet).

In examining the observations made by any traveller respecting the elevation of the snow-line, the most accurate scientific criticism must remain satisfied of their correctness by the following theoretical demonstrations:—

The height of the snow-line in a given range must be calculated theoretically on the basis of a comparison with other ranges in the same meridian and in the same parallel; the obtained result should then be compared with the figures arrived at by actual observation, and it must then be carefully considered whether the discrepancy that may occur can be at all attributed to climatic conditions and peculiarities of the country.

Humboldt, in his classical work 'Asie Centrale,' supplies us with the requisite figures for arriving at a definite conclusion.

In the same meridian with the Celestial Mountains we find that the height of the snow-line is, viz.:—In the Altai (Tigerski Belki), lat. 51° N., 6600 feet. On the northern slope of the Himalayan range, lat. 32° N., 15,600 feet.

The Celestial Mountains extend, at the part visited by me, between latitude 41° and 42° N., which is consequently mid-way between the Altai and Himalayas. Taking the mean of the figures given above, we shall get 11,100 feet for the height of the snow-line of the Celestial range. In the same zone, parallel with the Celestial Mountains, the height of the snow-line is as follows:—In the Pyrenees (between lat. 42½° and 43° N.), 8400 feet; on Mounts Elburz and Kazbek, in the Caucasus (43° N. lat.), 10,170 feet; on Mount Ararat (lat. 39° N.), 13,300 feet; in the Rocky Mountains of North America (lat. 43° N.), 11,700 feet.

Humboldt, in his observations on my letter to Ritter, refers exclusively to the Pyrenees and to the Elburz Mountain. With regard to the first, they cannot be taken at all into account in determining the height of the snow-line in the Celestial range, as they are situated in a moist sea atmosphere, where the snow-line must be considerably lower than in the continental climate of the interior of Asia. The Caucasus, however, supplies a better point of comparison, if treated with proper discrimination. The height of the snow-line of the Kazbek and Elburz is 10,170 feet, under a latitude of more than 1½° to the northward than that of the Tian-Shan, and with a climate considerably more humid. On Mount Ararat, where the surrounding atmosphere is drier and the latitude 2½° more to the south, we find that the height of the snow-line is 13,300 feet above the level of the sea. If a range of mountains existed between the Elburz and Mount Ararat, under climatic conditions of an intermediate character as compared to those characterising Mounts Ararat and Elburz, and situated under the same parallel as the Celestial range, the height of the snow-line of these mountains would be determined at 11,300 feet.

All these figures computed theoretically by comparing the heights of snow-lines in the same meridian with the Celestial mountains, in different parallels or under one parallel zone on different meridians, coincide very nearly with my determinations.

The considerable elevation of the snow-line of the Celestial mountains is to be explained by the peculiarity of the geographical position of the range, and the character of the surrounding atmosphere. It is generally admitted as a fact that a dry atmosphere has the effect of elevating the line of eternal snow very considerably. Thus, for instance, the snow-line on the southern slope of the Himalayas occurs at 12,180 feet, while on the northern side it rises

to 15,600 feet. This anomaly is only to be accounted for by the southern side of the range being exposed to winds charged with the humid vapours of the Indian Ocean, which settle on the cold mountain slopes in the form of snow, while at the same time the northern slopes of Thibet are reached by the same air, but which is completely free from moisture. The extraordinary dryness of the atmosphere of the Celestial Mountains, compared to the Altai and Caucasus, is strikingly exemplified by the following instances. In the neighbourhood of Riddersk, in the Altai Mountains, the dew falls so heavily that the dress of the horseman is completely saturated when riding through the high grass, while in the sombre forests of the north-western Altai, called locally Taigi, the atmosphere is still more humid, and rain during some summers falls incessantly. Now, during the two years spent by me in the Celestial Mountains and Trans-Ili Alatau, I positively saw no dew, and the fall of rain in these parts—notwithstanding that the summer of 1857 was a remarkably wet one, and the Altai rendered impassable from this cause—was very small. In addition, the very vegetation of the Tian-Shan bears evidence to the dryness of the surrounding air. While the slopes of the Caucasus are clothed with dark and impenetrable forests, which prove so troublesome in the military operations of the Russians, the wooded surfaces of the Tian-Shan are of limited extent, and rhododendrons, which are so widely spread in the moist climates of the southern slopes of the Himalayas and of the Caucasus, do not grow at all in the Celestial range. If to this extraordinary dryness of the air in the Celestial Mountains be added the intense heats and powerful heating of the broad plateaux by the scorching rays of the sun, accompanied by cloudless skies and a rare atmosphere, a natural explanation will then be found for the height of the snow-line being at 11,000—11,500 feet. The few measurements of heights made by other travellers in Djungaria, and moreover by other methods, serve to confirm the accuracy of my figures. Fëdorof determined *trigonometrically*, that is by the most accurate process, the altitude of the highest point in the Tarbagatai at about 9900 feet. The Tarbagatai range extends under lat. 47° N., and is consequently nearer by 1° of latitude to the Tigeretski Belki than to the Celestial range. Computing the elevation of the snow-line of the Tarbagatai theoretically by a comparison of the heights in the Altai and Tian-Shan, we should obtain a result of about 8600 feet, while in reality the true elevation is considerably greater, as throughout the Tarbagatai range the existing snows, with the exception of two patches, are only sporadic, and the snow-line is not below 9500 feet. This case proves that the snow-line rises rapidly from the Altai to the Tarbagatai, owing to the greater dryness of a continental atmosphere. Lastly, the barometrical observations of Schrenk in the Djungarian Alatau, in

lat. 45° N., fixed the limit of eternal snows at 10,700 feet. Calculating then the height of the snow-line in the Tian-Shan by a comparison of that of the northern slope of the Himalayan and of the Tarbagatai ranges, we obtain 11,700 feet, and 11,950 feet if we take in the Djungarian Alatau.

In this manner all the facts of the case, not alone those supplied us by comparative geography and climatology, but likewise those derived from the exact observations of other travellers, tend to confirm my figures, and prove them to be sooner understated than magnified. Humboldt's doubts, therefore, as to the possibility of the snow-line of the Tian-Shan exceeding 11,000 feet in elevation, are disposed of, not only by ocular demonstration, but also on theoretical considerations.

The interesting question relating to the existence of pure alpine glaciers in the Tian-Shan, which is in intimate connexion with that of the height of the snow-line, was solved by me in complete accordance with the previously-expressed opinions of Humboldt and Ritter. I set out without any foregone conclusions on this point, but having experienced the remarkable dryness of the air in the Tian-Shan mountains, and having ascertained on ascending the Zaùkù-Davan that the height of the snow-line was higher than 11,000 feet, involuntary doubts entered my mind as to the possibility of the existence of real glaciers in the Tian-Shan. These doubts were, however, soon dispelled. At the sources of the river system of Sary-Djaza I came across five magnificent Alpine glaciers, and a "mer de glace" exceeding in size that of Chamounix. Notwithstanding some of the peculiarities of the Tian-Shan glaciers, owing principally to their prevalence at not more than about 2500 feet below the limit of the snow-line, while in Switzerland they descend as low as 5000 feet, their existence in the form anticipated by Ritter and Humboldt, on the strength of Chinese accounts, was fully confirmed.

It now remained for me to prove by actual observation on the spot the existence or otherwise of volcanic phenomena in Djungaria, and in the Celestial Mountains, to which Humboldt in his works so often alludes. I started on my journey firmly persuaded that I should find the conjectured volcanoes, or at all events some volcanic forms, and sought diligently (as Schrenk did on Lake Ala-kul) to establish the correctness of Humboldt's surmises with respect to the existence of volcanic phenomena in Central Asia, by which confirmation I knew a traveller would gain greater credit than by an incomplete refutation of the supposition. I was even aware that Humboldt was rather displeased with the researches of Schrenk, who clearly showed that the island of Aral-Tübe, on Lake Ala-kul, was not of volcanic origin. The opinions entertained by Humboldt on the subject of the existence of volcanoes in Djungaria were favourite

ones with him, and I regret that I was not able to confirm his cherished theory. Kullok Peak, another of Humboldt's mistaken volcanoes, was found to have no volcanic origin whatever. The hot springs, and the non-congelation of the waters of Lake Issyk-kul, were not accompanied by any volcanic forms in the Tian-Shan; and furthermore, all the native accounts of phenomena which from their description might be supposed to be volcanic, proved unfounded, and were at once disposed of on my examination of the localities where they were declared to occur. The result, therefore, of my researches on this point was that I became convinced of the complete absence of volcanoes, typical volcanic phenomena, or even volcanic forms throughout the Celestial Mountains. It is true that there existed in Djungaria at one period some "Solfatara," or smoking apertures, from which there was a discharge and deposit of sulphur, and that some of these fissures, out of which the Chinese obtain sulphur, emit smoke even at the present day. But a careful inspection of one of the extinguished pits satisfied me that at all events in that case there was no volcanic affinity. In the neighbourhood of the pits discovered by me in the Katù mountains and in the Ili valley, I could trace no volcanic forms; but ironstone occurred, and owed its formation, as far as I could judge, to the pyrites that were widely spread in the vicinity. There was at the same time a discharge of sulphur emitted in the form of vapour out of numerous fissures, and which left a deposit on the sides. If it be taken into consideration that I found coal-formation largely developed throughout the Ili basin, and that coal is obtained by the Chinese in the neighbourhood of Kuldja in large quantities from very deep seams, the whole process of the formation of sulphur can then in my opinion be reasonably explained by the combustion of some coal-seams in this basin, which would at once set at rest the question of supposed volcanic agency.

I cannot positively affirm that the origin of the other smoking pits of Djungaria, and particularly Humboldt's famous "Solfatara" of Urumchi, is susceptible of the same explanation, although the analogy between all the Djungarian "Solfatara" would appear to be confirmed, native accounts excepted, by the circumstance that the Chinese, who are very expert in recognising such sulphur formations, procure sulphur from the "Solfatara" of Katù, which I visited. With still less certainty can I deny the existence of volcanic phenomena or volcanic forms farther eastwards in the Celestial Mountains. Humboldt, in his observations on the letter I addressed to Ritter, which was published in the 'Zeitschrift für Erdkunde," says that the Sangai, rising in the centre of the Ando-Cordilleras range, the most active of all the volcanoes in the world, forms an island of trachyte not more than two geographical miles

in diameter around it. From this I must of course conclude that the observation of a single portion of the Tian-Shan visited by me cannot serve as positive evidence of the absence of volcanoes and volcanic forms in other parts of this mountain-system. My conclusions on this question generally have already been made public in the letter referred to, but I must likewise observe in addition that all Asiatic accounts of phenomena which might be volcanic in appearance should be treated by men of science with great circumspection, as many of these accounts have already proved fallacious. I would here also remark that the impression produced on me personally by Djungaria and the Tian-Shan, leaves great doubts in my mind as to the existence of volcanoes in this part of Asia; and as I am the only traveller who has visited the Tian-Shan, I cannot accept the belief in their existence as an axiom requiring no proof or confirmation. My conclusion on this point, though only negative, is one of the most important results of my journey.

If in aspiring after truth I have been compelled to express opinions on two points of such vast importance to the geography of Asia which differ completely from those entertained by Humboldt, whose faith in the existence of volcanoes in the Celestial Mountains was as firm as that of Columbus in the existence of the New World, it does not necessarily follow that I cast a shade (in itself impossible) on the spirit of the greatest scientific genius of the age. Science is the eternal aspiration of the whole human race towards truth, and truth can only be grasped at out of a multitude of errors and misconceptions. No men, moreover, are more liable to fall into such errors than the pioneers of thought, who marshal their fellow-creatures to the great goal of truth, and call into existence worlds of new thoughts and conceptions. These giant minds are followed by a train of disciples for whom the path of investigation and final solution of great scientific problems is rendered comparatively easy. Thus there are the men of genius in science, or the master minds, who conceive great thoughts, and the workmen who follow up such of these thoughts as are susceptible of elaboration. Each has his separate functions, but on the most humble labourer in the field of science devolves the sacred duty of pointing out and rectifying any error into which the eminent master may have fallen. And in such a case the obscure advocate of truth should not be crushed by all the weight and authority of genius,—science being a problem open to solution to all humanity, and recognising no individuality or oligarchical superiority.

The science of geography has lately been deprived of two of its most brilliant leaders, Humboldt and Ritter. To follow their footsteps, to extend the circle of their researches, to strive after that eternal truth which they eagerly sought during their mortal careers,

to correct those few errors which are interspersed through the wide field of their inquiries, these are the duties of every votary of science, even of the most humble grade, and will serve as the best testimony of admiration and respect to the great masters. May the present effort be taken as such an expression, and as one of the many proofs that, dying, Humboldt and Ritter have bequeathed to humanity a living record of their great genius.

*St. Petersburg, 1st October*, 1859.

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XVIII.—*On the Island of Mahi, Seychelles.* By Lieut.-Colonel Lewis Pelly.

There are, in all, thirty islands in this group, varying in size from that of Mahi, which is about 17 miles long, by from 3 to 4 miles broad, down to that of islets containing only a few acres of ground.

The group may be divided into two clusters; one to the westward, round Mahi, and the other to the eastward, round the Island of Praslin, which is next in size to Mahi. The general aspect of both clusters is green and cheerful; but that of Mahi is the loftiest, for the peaks along the backbone of Mahi itself may be nearly 2000 feet above the water-line, while Silhouette, a woody, conical isle, lying about 17 miles to the northward of Mahi, rises into one central peak of from 2000 to 3000 feet in height.

The Seychelle Islands (which derive their name from a former French Minister) are a granite formation, cropping up in the centre of a vast bowl of coral. This bowl may have a diameter of some 120 miles: its rim rising nearest to the surface of the water, like one of the Atolls described by Mr. Darwin. Approaching the rim of this coral bowl from any point oceanwards, you strike soundings in from 7 to 8 or 9 fathoms. Here and there, especially on the western quadrant, you come upon 3-fathom patches. And on the northern, as also, I believe, on the southern edge, you find low sandy islands, sprinkled with scrubby brushwood, and differing altogether in appearance, as perhaps in structure also, from the Seychelle group proper. Bird Island and St. Abbs are isolated, uninhabited spots of the description under notice.

Running towards the centre of the bowl, the soundings deepen to 12, to 20, and to 32 fathoms; and give the last-named depth nearly up to North Island, which appears like a detached promontory of Silhouette. It seems, indeed, that the Seychelle Islands are the loftiest summits along the axis of a primitive system of submerged mountains, whose lower scarps and intervening slopes and plateaux support the coral growth now sketched.

A steepish woody ridge of hill-land runs the length of the Island of Mahi, now broken into transverse valleys, and now bright with a plot of greensward—here exposing a granite cliff, and there discovering a torrent-scarred ravine of red earth with overhanging brows of trees. Rain falls frequently, and almost every species of tropical plant seems to flourish: I observed, among other vegetation, the guava, the Seville orange, the leechee, the breadfruit, the manioc, the sweet potato, wild ginger and arrowroot, the caju-nut, cinnamon, cloves, palms of many varieties—for example the sago, the areca, the coco-nut, and the coco-de-mer; coffee, vanilla, the tamarind, the mango, rice, pawn sooparee, sugar, cotton, nutmeg, mace, the poppoi, also the casuarina, the sirus, the wood known on the island as the nut-wood, and which is useful for a broad, long, and durable planking, the fan-palm or traveller's friend, and the neem tree. I do not know how many among these species may be indigenous; but I am told that some at least of them have been introduced.

The mangoes did not look healthy; cotton and rice, I learned, had been extensively planted during the French occupation of the island, and throve excellently; coffee also is said to yield a good berry. Sugar—of which I visited an abandoned estate of some 600 acres on the north-west side of the island—does not seem to pay; but whether want of success were attributable to an unsuitable soil and climate, or to want of skill and industry, I could not accurately ascertain. The groves of cinnamon were dense, large, and luxuriant; but this spice does not pay as an export.

The climate of Mahi is reputed singularly salubrious for an island situate only five degrees from the equator. Fever is almost unknown, and the commonest disease is dysentery. Wood of an excellent and durable quality was formerly abundant on the slopes of the hills; but the supply was recklessly wasted, and is now nearly exhausted. The best wood for building purposes is now brought from Silhouette. Sheep will not thrive at Mahi. But goats, it is said, do well enough, although I saw very few on the farms. No cattle are bred on the island; nor is beef killed, unless when a cruiser may chance to call in. Both sheep and cattle are imported in small numbers from Madagascar. A few ponies also are imported; and I noticed one young camel, looking very raw, wet, and unhappy. Roads, in a general way, there are none; though one leads from Port Victoria straight up across the backbone of the island, but shrinks into a footpath as it descends the western watershed.

I saw but one specimen of the coco-de-mer, Praslin being the only island where this palm, unique it is said in the Seychelles, is indigenous or thrives spontaneously. It is called the loftiest and longest-lived of the palm tribe. When first it appears above

ground it throws out one large leaf, and for some years following throws out annually one leaf more. Then it begins to protrude its endogenous trunk; and when the trunk is well up, the age of the tree may, it is supposed, be known from the number of rings on its rind, added to the number of leaves on its coronal. The wood, branches, and fruit are very serviceable. The creole girls peel the leaves into thinnest strips, and work these into delicate and beautiful baskets and fans. The shell of the fruit you may find, anon, turned into the schallop of some Fukeer in Northern India.

The census, which distinguishes only between the sexes, gives the population of the whole group of the Seychelles at from 6000 to 7000 human beings. Of these, Mahi may number 2000, and Praslin 500 inhabitants. But this estimate is approximate merely. The population of Mahi is principally creoles; these are reputed indolent and good-natured, addicted to drink, especially rum; of easy morals, and long-lived. Their staple of food is manioc and fish, of which latter article there is abundance, though carelessly sought. They consume also poultry and rice, and occasionally turtle, which are brought from the Amirante Isles, and preserved in salt-water ponds, drained and flooded by the ebb and flow of the tide.

Port Victoria is the chief town of Mahi: a neat township, picturesquely dotted among underwood immediately above the line of sea beach and along the lowest swellings of a background of hills. It possesses a creditable stone-masonry church, and the Government House peeps out prettily from its English-looking grounds and shrubberies. A clear boulder-strewn stream rushes down between the Commissioner's lawn and the main street of the town. The houses in general are built of wood upon coral foundations, and have the high roofs, gables, and general character of the little chateaux and farmsteads of Normandie. Creole French is the language of common life, with manners and customs to match. Here, as everywhere else in the East, orientals adopt French modes more readily than they do those of any other European nation; and you may find a crisp-woolled minx of an African, with thick lips, gesticulating about her civil rights, and adjusting her kerchief, her boddice, and her gaudy skirt, just as though she were a pert little grisette.

Considered as a port, Victoria offers sheltered anchorage during the south-east trade and south-west monsoon; but is open to the force of that from the north-east. Mahi itself protects the harbour to the westward, and a chain of islets to the eastward. The southernmost link of this chain is separated only by a narrow and reef-strewn channel from the main island. However, few square-rigged vessels visit Mahi: occasionally one of the cruisers from

the division of the east coast of Africa calls in; and Port Victoria is considered, I believe, as one of the best stations in that division for giving leave to the men. American whalers sometimes put in for water or provisions; but, on the whole, the trade of the island is trifling, and is principally carried on in small schooners running between Mauritius, the Amirante, and Seychelles. These bring supplies and miscellaneous goods from Mauritius, and turtle, which are speared, from the Amirante. They carry back coco-nut. Estates of this nut yield good returns at Seychelles, and I was informed that the proprietor of the larger portion of Silhouette lives at Mauritius in affluence upon an income drawn from coco estates on the islet. When at Zanzibar, Captain Oldfield and I gave some encouragement to an Indian merchant to run a small cargo of rice, coffee, and other provisions to Mahi. The profit on the venture was considerable, although the goods were sold out of hand. And I have no doubt that, on a small scale, a remunerative trade might be driven between Seychelles and the east coast of Africa. The goods from Zanzibar were shipped in a dhow, which ran across in the month of May; and this was, I believe, the first native craft that had ever made the passage.

Politically considered, Seychelles, like the Amirante Isles, are a dependency of the Mauritius Government. The subordinate administration of Seychelles is in the hands of a Civil Commissioner, on an income of about 1000*l.* per annum. The chief judicial functionary is a District Magistrate, who becomes administrator *ad interim* in the absence of a Commissioner. There is also a Medical Officer and an Inspector of Police, with a detachment of some 22 constables. The cost of the Seychelle administration I understand to be about 6000*l.* per annum, against a revenue of from 1300*l.* to 1500*l.* per annum, collected on the islands, and derived mainly from an excise on rum, together with a customs receipt of about 100*l.*, being an import duty at 6 per cent. *ad valorem*, gathered on the spot. It is asserted, however, that the bulk of the Seychelle revenue should be customs, but that these are principally collected at Mauritius, and appear in the Mauritius returns; since nearly all imports, whether of provisions, miscellaneous goods, and even coolies from India, are passed through the Custom House at Port Louis before being transmitted to Seychelles.

The jurisdiction of the District Magistrate extends to all criminal cases, wheresoever committed on the Seychelle Islands. He can imprison for any term; but in cases of murder he simply institutes preliminary proceedings, and the trial is held in Mauritius, whither witnesses and accused are shipped as opportunity may offer. Complainants, defendants, and parties criminally

charged, on whatsoever island, come to Mahi as the court of first instance. The Judge does not go on circuit. Appeal lies to the higher court at Port Louis in cases of imprisonment for more than one year, or of fine above 50*l*. Hard labour on the roads obtains, and is found to work well. The average number of prisoners in jail at one time may be about 50.* All civil cases are open to appeal to Mauritius. Landed titles, like other matters on the plea side, are subject to French law—the old Code Napoléon, I believe. About 12 judicial transferences of land have been registered in 5 years; the estates transferred varying in value from 1000 dollars up to a maximum of 5000 dollars. No land-tax is levied; all land being held in fee simple. All correspondence passes through the Commissioner, and is liable to his remarks, as head of the local Government.

The old French mark passes as the common small currency of the island. Its value may be about three farthings. The rupee and the dollar, especially the Maria Theresa or black dollar (still struck at Vienna from a die preserved for use on the east coast of Africa, I believe) are also current.

The inhabitants of Mahi assert that they suffer from being a dependency of Mauritius. They would prefer that Seychelles should be a separate government, so that their Commissioner might enjoy more real power, especially in financial matters, and for the prosecution of works of public utility. They consider, further, that the desired change would preclude references and consequent delays; that justice would be brought to their doors; and that there would be a greater incentive to development of the resources of the islands on the part of the local Government. They would like also some degree of Municipal Government to be initiated in the more considerable islands, such as Praslin, so as to save the necessity for reference in minor matters to Mahi. They would wish their coolies to be imported direct from India, instead of through Mauritius. Indeed, they complain much of the want of labour, although Captain Oldfield brought them a supply of nearly 400 emancipated slaves from the east coast of Africa. These are now carefully registered, protected, and provided for. I talked with one man, a runaway slave of His Highness Syed Burghesh. The fellow told me his wages were 6 dollars a month, that he was saving money, and that he intended to return to Africa directly he had made a bag.

Defective titles to some of the estates is another alleged ground of complaint. It appears that, in the first instance, French immigrants settling on these islands received grants of lands in allot-

* I am not sure but that some of these fifty may have come from Mauritius.

ments of 108 acres each, upon condition of residence and building within a period of one year. These grants were made provisionally at Seychelles, and were afterwards confirmed in perpetuity by the Superior Government at Mauritius. When, however, the English took Seychelles, and which they did some little time before taking Mauritius, they continued to grant provisionally as before; but of course no confirmation took place from the Isle of France so long as the latter remained French. Hence the titles of estates granted during that period were unconfirmed at the time, and still so remain. This defect, the creoles say, should in equity be remedied.

Thus much for the little plaints of the good people of Mahi. Others assert that all their difficulties and their poverty are due to their own want of thrift, industry, and enterprise. One fact is obvious—that Nature has given them a delightful island, abundantly watered, well stored with wood, rich in soil, capable of producing the fruits of many climates, and healthful. Where these blessings are freely bestowed, it is difficult to believe that man cannot render life useful, prosperous, and happy, provided only he himself be virtuous, prudent and persevering.

The mail-steamer to and from Aden and Mauritius calls at Mahi; except during the months of June, July, and August, when, owing to the force of the south-west monsoon, it avoids the islands on its passage out. It so chanced that, during the week I passed in Port Victoria, waiting on board Her Majesty's steam-frigate *Orestes* for the mail, the Seychelles were visited by a violent hurricane, the first ever experienced there. This circular storm, strengthening out of the south-east trade, veered southward, westward, and gave us its full fury from north-west. It then moderated northwards, hung a while at north-east, and finally subsided into the south-east trade again, followed by floods of rain. I do not remember to have ever heard any sound so mournful as the Titanic sobbings of that hurricane—now hushed an instant, as, spent with passion, the tempest gasped for breath.

During the storm there were reefs all round us within a few hundred yards, and the shore was not a mile distant; yet we could see neither land nor reef, nor even sea, but only a scud of foam blown past the side like lace rapidly unrolled. On the storm subsiding, the scene ashore was melancholy indeed. The steeper hill-slopes had been washed bodily down into the valleys: in some instances crushing, during the night, estates, families, and houses in one common grave and ruin. The brook by Government House had burst its banks, and poured in a torrent down the main street of the town, hurrying houses, provisions, men, women, and children along its flood towards the sea. Trees were torn up by the roots; the palm tops were twisted off at the neck, as during the cannon-

ade at Mohamera; and the French Religieuses were crushed into the earth as they stood with their priest and their scholars at morning prayer in their hospital. I left one day afterwards; but even then some fifty people were asserted to have been killed or severely maimed, and it was assumed that some fifty more were missing on the one island of Mahi. The little schooners were crunched together and sunk.

## XIX.—*Explorations in North-Western Australia.*

By JAMES MARTIN, Esq., M.B.

Communicated by the Governor of Western Australia, through the COLONIAL OFFICE.

### I. Mr. MARTIN's *Journal of the First Voyage*, 1863.*

### FROM DOUBTFUL BAY TO THE LOWER RAPIDS OF THE GLENELG RIVER.

*June* 22, 1863.—Doubtful Bay is a magnificent sheet of water, 9 miles in length from north to south, and six miles in breadth from east to west. Although in the summer vast quantities of water may from all sides pour into the bay, and the tides gain additional force thereby, yet, as it is thoroughly protected from every wind and from a heavy sea by a range of islands and reefs to seaward, and the natural break-water of the Montgomery Islands and the coral reef, 14 miles still further to the westward, as the holding ground is of the very best, and as there is abundance of room in which to work the largest ship, Doubtful Bay, if ever this part of the Australian coast should be colonised, will prove a harbour of refuge second to none. From the great rise and fall of the tide also, 36 feet, this bay would be a good site for works necessary to the repairing of ships. A better terminus to the system of Australian telegraphs, when connected with those of Europe and Asia, I think it will be difficult to find. There does not seem to be any agricultural or even pastoral land in the immediate vicinity of the bay, and the hills both of the islands and the main are of the most precipitous character. The south-east shore is fringed with an immense mangrove swamp, intersected by numerous deep creeks. It has all the appearance of being the mouth of a large river.

* This part of the memoir is a portion of the narrative of an expedition sent out, with live stock, from Western Australia, in search of new pastoral land in the vicinity of Glenelg River (Lat. 15° 40′ S.). The exploring party consisted of three gentlemen (besides Mr. Martin), and sailed from Champion Bay (20° 45′ S. lat.) in the schooner *Flying Foam*, on the 6th of June, 1863.

About the centre of this mangrove swamp, on its western limit, rises the Conical Hill we had in line with the centre of "Foam Passage" when we entered the bay last night. It is a remarkable hill rising abruptly from among the mangroves, of a deep red colour, and without any other hill or land visible from our anchorage, nearer than two miles. I believe it to be of the old red sandstone formation, as are the islands to the westward of the bay. Wood and water are obtainable in Doubtful Bay. The old red sandstone here exhibits a great variety of the most picturesque scenery. Outside the bay, in the islands, it attains its grandest development, wrapping round older rocks and effectually protecting them from the action of the tides and current. The rock is a conglomerate of fine hard gravel of a dark red colour. The character of the old sandstone, and the way in which it is broken and worn away to form picturesque cliffs, is also well illustrated in the smaller islands to the south of the entrance to Doubtful Bay. A bold headland is here nearly separated from the principal island by the action of the waves, which have already worn away deep cavities beneath, and threaten soon to complete the destruction they have begun. The dark, frowning, and gloomy masses of rock are piled over one another in an order not irregular, and the huge step-like terraces, by which one may descend nearly to the line of high water, afford admirable instances of stratification, joints, and faults. The larger of the rugged, isolated, projecting fragments in the island, taken as a type of the whole group, is from 100 to 120 feet in height, and about the same in breadth and thickness.

At 8.45 A.M., a party consisting of three of the explorers, with one servant, and the master of the vessel, left in the long boat to climb the range eastward of the bay to search for a navigable entrance to the Glenelg. Fires, in groups of two, sprang up from the sea-beach, where the party landed, to the summit of the first range;—they are doubtlessly native signal fires. At noon the tide was running into the bay at the rate of four knots per hour. A great many more fires are now springing up in all directions. At 3 P.M. a signal was made from the shore, upon which we got under weigh. About a mile and a half from our anchorage we met the party in the long boat. They report a rugged country without soil, but with trees and coarse grass growing luxuriantly. the latter was nearly three feet in height. Among the trees seen were—eucalypti, acaciæ, adansoniæ, palms, and a tree whose leaf, as to venation and other features, closely resembled the camellia. The walk was so fatiguing that the ascent to the highest point of the range was not accomplished. The natives seemed very numerous, judging by their fires and cooeeing, but they kept out of sight at first; indeed, a near view of one individual only was obtained.

This native carried a bundle of unusually long spears. Before the party rejoined the boat, however, several were seen in the distance, as if watching the behaviour of their unlooked for visitors. From the set of the tide, which seemed to come from the north-eastern of the two supposed mouths of the Glenelg, as laid down upon Grey's chart, we determined to examine it more closely. At 4 P.M., although the tide was just commencing to run out, the wind was sufficiently strong to carry us about 2½ miles up the supposed river, to a point on the western shore, where a few detached rocks to the northward protected us from the force of the tide. We anchored in 10 fathoms water at about 50 yards from a rocky precipitous shore, about 30 minutes after sundown. At one mile from the entrance of this passage, on the eastern shore, there was a broad water-course, with mangrove swamps on either side, trending from east by south.

*June* 23.—Before breakfast a party went on shore, and in an hour returned with numerous specimens of the flora, together with geological and other specimens. Of the geological collection, by far the most interesting were the basaltic fragments. At 9 A.M. the tide was ebbing rapidly. After breakfast another boating party returned with many specimens of coral and sponge alive, obtained from just below low-water line; also a trochus and triton, both of which I believe to be undescribed species; rock-oysters were found adhering in large clumps to the rocks and to each other, but they were of small size. At a quarter past 10 A.M., we fired a gun as a signal to the land party, who forthwith came on board, just as the anchor was weighed at the commencement of flood-tide. The passage here is little more than half a mile wide. About two miles to the north of our anchorage a reef of rocks came out into mid-stream. Through the passage, in soundings of from 8 to 17 fathoms, the tide was now rushing with immense velocity; at one time it took three men at the tiller to keep the vessel under command. Sailing through this critical pass, not more than a quarter of a mile in width, the stream opened to a wide expanse of water about 6 miles in breadth, from east to west, with an apparently clear extent to north of about 9 miles. There seems to be an opening to seaward on the south-west boundary. This splendid sheet of water we propose to name George Water: there was barely a ripple upon its surface, and during the afternoon we were sailing gently through with a scarcely perceptible tide, at a rate varying from two to three knots, and in soundings exceeding 15 fathoms. On our passage we observed dolphins, seals (*Phocæna vulgaris* and *Leptonyx weddellii*), and many aquatic snakes (both *hydrophides* and *hydri*). At 3.30 P.M. the water shoaled rapidly to six fathoms; the vessel was put about immediately, and we then anchored in east longitude 124° 39′ 15″, and south latitude

15° 45′ 40″. Before us stretched a long line of mangroves with several openings: one of the latter a little westward of our course. As soon as possible after coming to anchor, the boat party, as yesterday, left with provisions and equipment, for 24 hours, to search for a navigable passage to that portion of the river which had been seen by Grey; from which point we cannot now be distant more than ten miles in a straight line. The force of the tide, strange to say, is not much diminished here; further observations may, perhaps, show the reason why. At 8 P.M. the boat party returned; they had found the passage N.N.W. of our anchorage to be navigable, with a muddy bottom, and boundaries on either side of mangrove banks. At a distance of about four miles from the vessel, the water-course divided at the base of a round hill, up which our explorers climbed a part of the way; but night coming on, they returned to the vessel.

*June* 24.—At 9.25 A.M., the boat party again left to search for an opening to the eastward of the mangrove bank. The stream immediately before us has a mud bar, dry at low water, but, from soundings taken last night, with more than a sufficient depth of water on it at high water; inside the bar the soundings exceed 15 fathoms. An ibis, resembling the *ibis religiosa*, or white ibis, was seen on the mud bar, but beyond the range of our guns. A curious marine creature of the order *Errantia*, family *Eunicidæ*, was this day captured alongside the vessel. It may be described as an elongated and distinctly annulated worm, possessing a well developed head, furnished with tentacles and eyes, and a mouth with an armed proboscis. The branchial tufts were developed only slightly. At 1 P.M., the boat party returned unsuccessful as to their search for a navigable opening; so, half-an-hour afterwards, we weighed anchor and crossed the mud bar in from 3 to 4 fathoms water; an hour and a half after this the ebb-tide commenced, and we cast anchor in 6 fathoms water about a mile south of the confluence of the two broad streams immediately before us. Two parties then made preparation to start directly to examine the two streams. One of them, with the master of the vessel and one man, went in the long boat, and undertook the exploring of the western stream; the other, taking the gig, pulled up the eastern. I belonged to the long-boat party; we thoroughly examined our water-course and its tributaries, but we found that all the creeks terminated in tangled mangroves, through which the boat could not pass. At the junction on the return trip, we met the party in the gig, equally unsuccessful: mangroves baffling all in their attempts to get through. The head of the broad sheet of water we entered yesterday, so far as we have examined it, consists of numerous islands, having in many cases their surfaces some distance below high-water mark. The creeks which intersect these low mud

islands are deep—from 6 to 17 fathoms—with steep sides covered with a dense growth of at least five species of mangrove. At the head of one of these creeks the water was only brackish at high water; this fact, coupled with the appearance of flocks of cockatoos and pigeons, argues the presence of fresh water at no great distance from our anchorage. A white crested eagle-hawk was this evening shot, whilst perched upon our topsail yard. Another white crested hawk, with wings of a rich chocolate brown, the extremities of the feathers darkening to almost black, was shot, whilst perched upon a mangrove; this I believe to be an undescribed species; I have therefore spared time to preserve the skin and skull. The aquila fucosa we have seen already several times.

*June* 25.—At 4 A.M., two boat parties were dispatched. In the long boat, Mr. Cooper and Mr. A. Brown, with one servant, went to examine a gulley in which we thought we saw a cascade on the 23rd, with a view to discover some convenient spot where we might obtain a sufficient supply (1000 gallons) of fresh water to fill up our tanks; we have only 600 gallons on board now; the stock require a plentiful supply, as the temperature ranges rather high. The shore party in the gig consisted of two of our party, with a man to bring the boat back after they had landed. The shore party were to walk to a high hill, distant about 5 miles, and from its summit to examine the country, and if possible discover water communication with that portion of the Glenelg seen by Grey. The man, after landing the party, was to return to the vessel and then explore the creeks in search of fresh water. The gig returned at 8 A.M., after landing us on a mud-bank where there were tracks of alligators, both large and small. One large creature,—its motion was too rapid to catch more than a glimpse (although from that glimpse I believe it was an alligator),—ran down the mud-bank opposite to which we were anchored, and with a loud splash plunged into deep water. This was about the time of sunrise. I watched some time, hoping to see it again, but in this hope I was disappointed. Parrots, cockatoos, pigeons, and kingfishers, were all most richly coloured; they were very numerous here. Small birds, too, not larger than humming-birds, fluttered about in great numbers.

The morning was occupied in taking observations to determine the exact position of the vessel. Found the longitude to be 124° 39′ 12″ E., and latitude 15° 43′ 10″ S. Found a scarlet-and-black pea in the pod, with leaves but no flowers. Found a half-ripe bean floating past the vessel. The long-boat party returned at 1 P.M. After sailing down the western shore of the broad reach for a short distance they landed at promising spots and looked for water; and although they did not find water, they

collected some highly interesting geological specimens. Finally they landed at the conical red hill, four creeks to the south of the cascade gully;—(this latter, by the way, is no cascade at all—but merely a vein of greenstone, which, glistening in the sun, gave us the effect of falling water when we were about four miles off); but, to continue: the party had landed and were advanced some distance in the muddy bank of the little stream, when they overheard natives among the mangroves. In a few minutes about 20 natives made a bold dash to cut off the party from the boat. A very numerous body were also seen rapidly approaching in an opposite direction, that is from the south. The first body of natives then advanced steadily in line, each with a spear shipped in a woomera (throwing-stick) and a bundle of spears held in the left hand. At 15 paces from our party, who had now covered each his man, the natives were prepared to throw their spears, as was seen by their left hands being lowered from the spear about to be thrown. One of them then stepped in advance, and just as he was in the act of hurling his deadly weapon, the first shot was fired. Although the native fell, the rest still advanced steadily. A second then ran forward: he fell at the firing of the second shot. This made them pause for a moment and then retreat in all haste behind the mangroves. During the retreat, a third charge of shot was fired at one poor fellow in the act of running away; none of the shots proved immediately fatal. A ludicrous incident in the affair happened to the man in charge of the boat. He was in the water endeavouring to prevent the boat grounding when he first saw the natives; he immediately took up the gun left for his protection, and found it was not loaded. He at once loaded it, and then discovered there were no caps left in the boat. The affray commencing, he levelled his uncapped piece and commenced a series of shouts and grimaces that rivalled, if they did not excel, those made by the natives. From these details two conclusions may, I think, be arrived at. First: That a species of discipline prevails among the natives; this was evident from the regularity of their advance and retreat, and their conduct under fire. The use of fire-arms was apparently unknown to them; the rifles, judging by their approach to within a distance of 15 paces, they probably mistook for a kind of club. Second: That the attack was premeditated, as will be seen from the following particulars:—Their personal decoration must have occupied them some considerable time; their foreheads and temples were ornamented with the figure of a half-moon, painted in white. Each man carried a bundle of very long spears. They had most likely seen us sail by their encampment last Tuesday afternoon; indeed, we passed so closely as to see plainly that the place was a native encampment, by the number of small fires, the smoke from which just curled up above the mangrove

and other trees. After the skirmish our party passed by some of their fires recently extinguished by scattering about, probably with a view to conceal their proximity just before the attack. Around their fires were strewn fragments of greenstone (syenitic) with conchoidal fractures, broken so as to adapt the cutting edges for making and pointing their spears, chips and shavings of which lay in all directions. Specimens were obtained of this greenstone and also the limestone (a brecciated limestone) which is used, after burning, as a paint. Several other geological contributions were brought away from the vicinity; they nearly all belonged to the primary group.

None of the native weapons were secured, as it was not deemed expedient to follow them into the mangrove thicket; and the whole affair from beginning to end occupied so short a space of time that not one of the party noticed even whether the spears were barbed or not. The half-moon figure seems to be their war standard: even the night previous to the encounter we noticed the shape of the fires on the side of the hill above their camp, to have a half-moon-like outline. In person the natives were tall, broad-shouldered, muscular, and exceedingly black. Their hair was straight and tied at the back of the head. They had no covering whatever. Our party remained on the spot for about half an hour afterwards, collecting such botanical and other specimens as lay in their way. Just before leaving in the boat, the native women and children, who, from higher ground, had surveyed the attack, commenced a wail which resembled that fabulous Dutch concert, where every performer contributed to the harmony by playing his own melody *fortissimo*, all commencing at a given signal. One remark more may be worth recording, perhaps, as it may tend to prove how little communication takes place between the various native tribes. When the attacks were made on Grey and Stokes, the natives invariably retired when a shot was fired, or, at latest, when the first man fell. Here, however, it was only at the second shot that some connection between the boat party as a cause, and the falling of their men, as an effect, seemed to dawn upon them. The report of the rifles did not produce the slightest hesitation or sign of fear. The afternoon was occupied in attending to botanical specimens, securing various packets of seeds, and so forth. A very pretty gomphrena was among the botanical collections of to-day.

At 4 P.M. the land party returned. From the summit of the hill they had seen the River Glenelg, distant about six miles to the eastward, and they recognised the large lagoons with streams running into them, as laid down in Grey's chart. They also saw the River Gairdner and the land away to the north as far as Camden Harbour. But the 30 or 40 miles of low flat country, as shown upon Grey's chart, seemed from the position of our party to consist of

well-grassed ranges of hills, with here and there fertile flats. The hill from which these observations were made was about 600 feet above mean sea-level; but viewed as this part of the country was by Grey from a distance of 15 miles or more, and at an elevation of 1000 or 1200 feet, it doubtless presented an aspect exactly corresponding to that mentioned on the chart. The party also sighted the Glenelg running towards George Water, and also its upper course above the rapids, taking a general southerly direction. They also observed a chain of mangrove marshes running from some swamps, on the northern side of the hill, towards and into Camden Harbour. From these observations and bearings it is probable the water we are now in has no navigable communication with the Glenelg nearer than George Water. Only one opening remains to be examined and that lies in the north-east corner of George Water, so named after the discoverer of the inland Glenelg. The impenetrable mangrove-swamps forming the northern boundary we propose to name "Barlee's Impediment," after the Honourable the Colonial Secretary of Western Australia. More tracks of alligators seen in the mud to-day.

*June* 26.—At 9 A.M. a large alligator, not less than 20 feet in length, came out from the mangroves abreast of the vessel and slowly floated along with the receding tide, just below the surface of the water. With the binocular glasses we could clearly distinguish the head, eye, ridges of the back and tail, and observe the slow paddling motion of the feet. The master of the vessel, whilst out with the long-boat in search of fresh water, saw a small alligator, about 3 feet in length, on a mud-bank; he fired with shot, but these glanced from the creature's back as if it had been a coat of iron. At 10 A.M. the boats again left to buoy the stream to an anchorage nearer the spot where they expect to find fresh water. At noon the boats returned; they found an abundant supply of fresh water and cut a road through the mangroves to the water's edge in the creek. The master buoyed the passage to within a few yards of the road. At 5 P.M. set sail to go up to the new anchorage. Anchored again in one fathom water, at low tide, about a mile and a half from last anchorage, up the north-west stream, past the confluence. The tide even here rises 36 feet. There is plenty of fresh water in the bush: almost every little gully yields a supply. It is perfectly fresh, but it has a slightly bitter taste, only just perceptible. During the night an exceedingly heavy dew falls here. Lying on the deck to sleep, we are obliged to make an awning of the mainsail.

*June* 27.—At daylight the gig, manned by two of our party, and one of the men, left the vessel, with provisions for two days, to explore the north-east corner of George Water. Shortly afterwards all spare hands left in the long-boat with two hogsheads to

fill with fresh water. At 9 A.M. the first trip was accomplished: they brought back 130 gallons of water. The obtaining of it, however, was very hard work. They had cut down mangroves from the spring to the landing-place, a distance of nearly 200 yards, and with the felled trees they made a corduroy road over the mud: along this road the water had to be carried in buckets to the boat. The road was passable on foot for a man carrying two buckets full of water, but not solid enough to bear a hogshead when filled; otherwise the watering might speedily have been concluded. I was left, with the steward only, in charge of the vessel: in the event of an attack by natives—here the creek is not 50 yards wide at low water and only 6 feet deep—I consoled myself with the belief that if the steward could only load fast enough we could manage to hold the *Foam* for some hours. The tide was still nearly 36 feet here. Only four hogsheads of water were obtained to-day: the softness of the mud proved a greater hinderance than was expected.

*June* 28.—At 1 A.M. the gig party returned. They have found a passage into Grey's part of the Glenelg, through the little bay to the north-east of George Water; the accurate examination of this bay was abandoned last Wednesday as unpromising. The Glenelg falls into this bay, which I intend to name Maitland Bay, by a very narrow mouth, situated on the eastern side, as I have hitherto firmly believed by every indication: the appearance of the ranges warranted this conclusion; and the fact that the chart of our voyage, plotted up to the present date, leaves a blank of scarcely two miles between our survey and that of Grey, made the case stronger; the banks of each part of the river in the two charts trending towards the other in the most unmistakable manner, and, seemingly, inviting us to persevere and accomplish their perfect union. This might have been done three days ago, had a more thorough examination been made; but Wednesday's search in the same direction proved useless, solely from over anxiety on the part of the explorers engaged. They did not deem themselves justified in spending an hour more in that direction; because (1) the stock of fresh water (our total consumption exceeds 50 gallons per diem) was getting low; (2) there seemed but little hope of a navigable river flowing into Maitland Bay; and (3) to the north of our anchorage a sufficiently broad and deep stream lay immediately before us. This, after very accurate and determined examination proving to terminate by numerous branches in mangrove-creeks, not passable by the gig, and in many places traced to the very base of the hills—this brought about the resolution to undertake the land exploration of Thursday, and the boat trip of yesterday, which have resulted so perfectly to our satisfaction.

Before quitting this series of mud-islands and mangrove-swamps, I could have wished to preserve an accurate delineation; but in-

artistic skill suffices not to record faithfully any of the varied effects. Photography alone could portray the minutiæ; I can only compare the effect to that of a level country with clumps of varied and exquisitely green trees, having openings—now straight—now serpentine—ever graceful; with a ground of crystal reflecting every leaf with an almost exaggerated accuracy. Reference to the meteorological journal will shew an almost entire absence of wind and cloud during the past week. The tides are regular, and at springs rise 36 feet. High water in the "Impediment," at full and change, would be, by calculation from observed tides, at 9 A.M. But the highest tides occur three days after the full and change.

At 6 A.M. got the anchor home and, towed by the long-boat, proceed south to the mud-bar, *en route* to the newly found passage to the known part of the Glenelg. The south-west passage from George Water to the sea bears south-west from the anchorage of Tuesday last. Native fires still discernible to the West of Cooper's Creek, but at some distance inland. Anchored at noon just inside Rocky Island at the mouth of Maitland Harbour, in the north-east corner of George Water. At 2.15 P.M. got the anchor aboard and attempted to tow with the long-boat, but we could only just keep our position owing to the force of the tide. At 4.20 P.M. a slight breeze from the south-east gave us a slight advance. The shores of Maitland Bay are of old red sandstone, covered with long coarse grass. Adansoniæ and Eucalypti prevail. A shrub (in fruit) with a strong lemon odour was obtained here, as also some varieties of Melaleuca, a white Hibiscus and some other plants in seed. The soundings in Maitland Bay averaged 15 fathoms.

The mouth of the Glenelg was entered with some little difficulty: a reef bars the entrance, but there is a deep channel near the southern end of the reef. The mouth of the river is about a quarter of a mile in width for the first mile; and it takes a general south-east course. There are several small rocky islands, in this first mile, from 25 to 50 feet in height. The banks also partake of the same precipitous character. A sudden bend of the river opens into a reach, having a northerly course of about four miles; and a width in some places exceeding a mile. This reach, like the first mile of the river, is studded with islands and reefs running parallel to the general course. We anchored to the north of a rocky point on the left bank, about two miles up the reach, in 5 fathoms water, at 7 P.M. A little to the westward and northward of the anchorage, on the right bank, there are mangrove and mud islands; and, no doubt, there is a tidal communication between this part of the Glenelg and Barlee's Impediment; at each change of the tide the set was observed to be

stronger in the direction of the Islands than in the direct course of the river.

*June* 29.—At the dawn of day, the tide serving, we hove anchor and continued our upward course. The wind was very light, so our progress was slow. After passing the northern termination of the first reach, the rocky banks of the river give place to mangrove and muddy shores; the belt appearing from the centre of the stream to be exceedingly dense. The course of the river also is now generally east by north. At about 1½ mile above the point the tide turned, and there being no wind we were again compelled to anchor. Soon after this, the long-boat with a party of six, left to take soundings and to explore the river. At 4 P.M. the tide left the vessel aground on a mud-bank, and in half an hour she canted over to an angle of 30° and remained high and dry. Tracks of alligators from the river up the mud are to be seen on the north bank; any one may easily understand, after an examination of mud-banks such as this on which we grounded, how fossil tracks were preserved until they were sufficiently hardened; here, on all sides, nothwithstanding the rush of tidal waters, tracks we know to be at least two tides old, remain as fresh and as perfect as if just made. This we observe both in the case of birds and heavy reptiles.

*June* 30.—About 1 A.M., the long-boat party returned, having gone up the river as far as the first rapids. They landed on the country marked in Grey's chart "rich alluvial soil;" they found it level and covered with luxuriant grass, in some places 9 feet high: in other places not exceeding 3 feet and apparently adapted to the keeping of sheep. They found fresh water in abundance and a second series of rapids in the river. They report the river itself to contain sufficient depth of water between half tides to sail the *Flying Foam* up to within a short distance of the first rapids. At 7 A.M. hove the anchor and commenced towing upwards. At half-past 11 A.M. got the vessel entangled among the mangroves to our great hinderance. A north-east wind, blowing in fitful gusts, ultimately compelled us to anchor again, having accomplished a distance of not more than two miles. The tide at ¼ ebb runs two knots per hour. At 5.30 P.M. aground: the vessel assuming an angle of not more than 20°. At 11 P.M., in a perfect calm but with a favourable tide, we again hove anchor, and for two hours drifted along stern foremost, to a postion about one mile to the eastward of Alligator Point, Long Reach. The river here gradually narrows. The tide flows with great velocity in the little bend of our evening anchorage. Duration of flood-tide, 5 hours; of ebb-tide, 7 hours. Rise 28 feet. The mud contains a large proportion of sand at this part of the river. Mosquitoes are both numerous and troublesome.

*July* 1.—At 1 A.M. at anchor in mid-stream in Long Reach in 3¼ fathoms. At daybreak we found the vessel aground at an angle of about 35°, with a ridge of rocks just rising above the mud, and stretching across the river from north to south, about 200 yards in advance of us. Ducks flying about, but not within range. At 11.40 A.M. hove anchor. Along the banks of the river at low water we see clumps of oysters, and a shoal of porpoises has passed and repassed several times. At noon cast anchor near what appears a favourable spot for landing stock in three fathoms at high water. The long-boat with two land parties left to search along the right bank for a temporary depôt and landing-place. At sunset the two parties met at the boat, when she was found to be about 20 feet above the water-level at the time. The mud seemed very slippery, so a line was sent from the vessel, and, the travellers having seated themselves, a slight impetus was given to the boat, when she glided down the mud at a flying pace into the water without the slightest mishap. Had the temperature been 120° lower, we might have fancied ourselves witnessing the Russian ice-hill sport. The parties report favourably of the spot selected for landing the horses, and the men have cut a road through the mangrove-belt down to the river-bank. In the afternoon, from the mast-head, took bearings of many of the hills shown on Grey's chart. Mount Lyell bears E. 28° N., and is distant about 7¼ miles. At low water we are surrounded by detached rocks: it was fortunate the anchor happened to be cast in the midst of a soft mud-bank. At low water the vessel draws 5 feet of *mud!* The mosquitoes are a perfect torment here. It is not possible to keep them wholly away: although we sleep in our clothes, cap and boots included, with thick gloves and veils, the little pests, assisted in their onslaughts by minute sandflies, are continually finding their way within our lines. In fact, our only means of obtaining a few hours' sleep during these long nights, consist in fortifying our position with an outer defence of opossum-rugs, with the fur inside; and even under these apparently favourable circumstances the enemy (occasionally with success) puts into force every conceivable stratagem, with a view to surprise us. The flood-tide commenced at 11.15 P.M., and in twenty minutes the vessel was afloat; after the first hour of flood, the rush of tide diminished and kept steadily on for three hours more, when the usual eight hours of ebb commenced.

*July* 2.—Before breakfast, two of the party landed on the south bank to see what game could be obtained; after an hour's absence they returned laden with spoil. One of two fine cranes shot by them measured from tip to tip of wings, 7 ft.; height, standing, 5 ft. 6 in.; from claw to lower end of femur, 1 ft. 3 in.; length of

femur, 1 ft. 1½ in: colour, rose or French grey, with a rose blush. Besides these, there were ducks, geese, and a teal. These birds were obtained from the swamps in the summer bed of the Glenelg, left bank; I never saw so many varieties of birds or in numbers so great, in any other part of the world. For breakfast we had geese obtained in a raid last night; they were of excellent flavour, but not fat: perhaps they are scarcely in season at present. The ducks are exquisite eating; they fly over from one side of the river to the other in vast flocks. At 45 minutes after noon we commenced landing the horses, and in an hour they were all safe ashore, in very fair condition. Not one of them has suffered more from the voyage than a week's rest and green food will remedy. The landing, although conducted in rather an every-man-his-own-master style, was certainly as smart and as successful a work as could be wished. At 3 P.M., five of the party started with the seven horses to travel up the right bank of the river to the spot selected for the temporary depôt, whilst the long-boat under the guidance of the master of the vessel carried a load of provisions and stores by water. The long boat returned at sunset having left the depôt party with the horses safely encamped.

*July* 3.—A watering party went to the rapids with two hogsheads. They returned at 4 P.M., having been detained only by the tide. Preparing now for bush exploration. We propose first to examine the country between this and Camden Harbour. Amongst many highly interesting botanical treasures secured this day, I find a very beautiful bunch of flowers gathered from one of the numerous white acacias, which we here find growing plentifully on the banks of every fresh-water stream. It is generally associated with the palm. As the palm alone here seems to be an unfailing indicator of fresh water, so this acacia would appear to be a finger-post to point out streams plentifully supplied and constant. The tree here attains a height varying from 15 to 30 feet; but at a mile or two of distance from the mangrove-belt which fringes every salt-water stream, it attains, in some instances, a height exceeding 100 feet. In every detail it answers to the description of Mr. F. Gregory—"very handsome tree, resembling an ash . . . . . bearing a beautiful white flower, 4 to 5 inches across, having on the inside a delicate tinge of yellow, and yielding a sweet scent like violets."* Some bunches of this exquisitely beautiful flower measured 3 + 2 + 2 feet. Where several of these trees happened to be in flower, in close proximity, the violet-like odour was perceptible at a great distance. Our old friend the very beautiful pea,—of a bright scarlet colour, with a jet-black spot on one end,

* 'Journal of the North-Western Australia Exploring Expedition,' F. Gregory, p. 18.

is still met with in every ramble ashore. These peas appear from the seed-pods to be precisely similar to those of *Abrus precatorius* which come from the East and West Indies, where they are used as beads. The leaves and root of this plant taste like liquorice. In the West Indies the *Abrus precatorius* is called wild liquorice. The roots abound in sugar, and from experiments made since the return of the expedition, I believe them a perfect substitute for liquorice in every respect. These beautiful seeds are strung for necklaces and other ornaments by the people of both Indies. Their specific name (*precatorius*) was given from the fact of their being occasionally made into Rosaries. De Candolle, speaking of the *Abrus*, says, "these plants attain a height of about 9 ft. The seed is a wholesome pulse." Hughes, in his 'Natural History of Barbadoes,' treating of *Cajanus flavus*, a pea most closely allied to *A. precatorius*, says:—"I know of no part of this shrub but what is of some use. The wood is good for fuel, and by the often falling of its numerous leaves the land it grows upon is very much enriched; and its fruit is of great service by affording hearty, nourishing food to man and beast. The peas, green or dry, are boiled and eaten, and esteemed very wholesome, especially if eaten in the wet time of the year; for, being of a binding quality, they prevent diarrhœas and dysenteries, so common in wet seasons. The branches, with the ripe seeds and leaves, are given to feed hogs, horses, and other cattle, which grow very fat upon them." Nearly every word of what is here said of *C. flavus* applies to the pea now found growing abundantly in the Glenelg district. Here, too, the aborigines have discovered the valuable properties of this useful legume: for on the 31st July, on an island in Collier Bay, many pods of this pea were found among the remains of a native feast, although no plants were observed growing upon the island.

*July* 4.—Went to the depôt in the gig: it is just below the first rapids, on the north or right bank of the Glenelg, and within the limit of the summer bed: not a very nice spot. The grass is plentiful, but rank: so much so that the horses feed away to sweeter grass growing within a very short distance to the north and east. Mount Lyell is just visible among the trees, distant about 4½ miles north-east. Camden Harbour would seem to bear W. 33° N. from us, and to be distant about 18 miles in a right line; but so many ranges of high hills intervene, that we have no expectation of seeing the sea-coast in that direction, until we are within a distance of a few miles. In some fresh-water pools around the encampment, a lily of great beauty grows abundantly.

*July* 5.—At 8 A.M. walked to a hill about a mile and a half W. 11¼ N., to seek ground for the measurement of a base line, but no suitable locality was found. The hill proved very rugged;

in some places the stones had sharply cutting edges, in others they were rounded and loose,—piled in heaps; in all cases, owing to the luxuriant clothing of grass, they were seldom seen before they were felt. There is no great variety of grasses on our route of this morning, but all are thickly growing, and in height run from 3 to 7 feet. Nearly all the hills appear grassed to their summits. This hill, which by Grey's chart is in a line with our depôt and Mount Yule, afforded no extent of view to the north; a higher range, about two miles distant cut off our view in that direction; but to the east our range of view extended to Mount Lyell and its neighbouring hills. The horses are eating better to-day; it was, of course, no more than might be expected that horses after being on board ship for a month, and being in the mean time transferred to a new country, should, when landed, eat sparingly at first of their new food. Even the sheep to-day looked round bewildered, and showed but little disposition to eat. They cannot understand at first that grass four feet high, somewhat coarse and dry, as it is near the depôt, from the advanced period of the season, is their destined food for the future. But in a few days all kinds of stock will feed amply here. The little tree with melon-like seed-pod and lemon odour is now in flower all about these hills. Its yellow flowers and leafless stem look very curious as they peer above the high grass. I saw no specimen exceeding 9 ft. in height. Walking among the acacias after sunset reminds one acutely of the little violets in the old country. In the afternoon sought for beetles, but after a diligent search, extending over nearly four hours, I was only rewarded with two or three small specimens. A few Geocores and Mantidæ were seen, but not captured. Whilst hunting for insects, I came across a dead tree with the bark off, for a space of 3 ft. 6 in. all round. I tested the wood with an axe—it was exceedingly hard, and made the axe rebound. The barking I do not think to be the work of aborigines, as it is so regularly done, and apparently with a keener edge than the stone axe of the Australian native. As our camp is situated close to the Rapids, as the tree is much older than any of the trees in the immediate vicinity, and would therefore be selected for marking by any white man, and, as Grey's route on my copy of his chart runs close to this spot, I am convinced that the tree is one marked by Grey's party.

## LAND EXPLORATION TO CAMDEN HARBOUR.

*July* 6.—At 7 A.M., barometer 30·105; thermometer 55·8; wind 0, cloud 0. Yesterday I found a plant that had the smell and taste of mint, and another that smelt strongly of musk. At 9.30 left camp with two of our party, three saddle and two pack-horses, with

a fortnight's provision, having for our object to reach Camden Harbour, and examine the country between the Glenelg and the sea along the north-west and north boundaries of the district. Hanover Bay and the Prince Regent's River we do not at present intend to explore. I should describe the country between our starting-point and our noon camp as well fitted for sheep, especially after the present growth of grass has been burned—as for feeding it down, it would be impossible. The riding over it now is very rough work, because we keep as nearly as possible to our proposed course N. 57° W., over hill and valley; but if the object was to find an easy road, I can see no difficulty whatever. Pitched our camp at 5 P.M. on the western branch of the Gairdner River. The afternoon's march has been much easier than that of the morning, and we have passed over a greater distance (6 miles) with less fatigue to our horses. From the summit of a range 600 to 700 ft. high, a beautiful prospect was obtained. The whole of this day's track lies through a splendidly grassed country; few birds have been seen, but kangaroo and turkeys have been noticed beyond range. My two companions ascended a hill to the west, and from the top they could see the line of swamps extending towards Camden Harbour. During the night a heavy dew fell, and some birds, uttering a cry I could not recognise, flew over our camp.

*July* 7.—Started at 7 A.M.; country good at first and easy to travel over; rode two miles to the foot of a double-cone hill, 500 feet high, then turning westward $3\frac{1}{4}$ miles round the base of two hills, one of them 700 feet in height, and $2\frac{1}{2}$ miles north of fine country to another hill 800 feet high, from which we had a magnificent view of sea and islands in Brecknock and Camden Harbours, with arms of the sea both north and south. From the hill to our camp, one mile, the country was exceedingly rugged, with steep hills coming almost to an edge up and down. In a rocky gully of coarse red sandstone I obtained a large collection of shells. The grass was rather coarse and rank, like coarse wheat-straw; the country more rugged, but still easy and well grassed; noticed some poor sandal-wood, also acacia, baobab, and palms, and a rose-like vine. Good water, probably permanent, is found wherever palms are seen. Camped near the southern arm of the sea, which terminates in mangrove-swamps running towards a remarkable conical hill nearly due south.

*July* 8.—Travelled over a country with perfectly easy succession of undulations, then crossing the heads of several tidal creeks with mangroves, one of which we attempted to cross but failed, found a particularly easy country with gravelly soil stretching quite across the neck of the peninsula towards Camden Harbour. It was singular that our route of yesterday should have been so remark-

ably rough; we chose it because it appeared the better of the two, but our march of to-day, although only a short distance from it, may be considered quite easy and well grassed. At 1 P.M., ascended a hill and took bearings; pack-horses and all went up here; we had a magnificent view of Brecknock Harbour; the green islands studding it and its silvery unruffled surface, from the position in which we stood could only be compared to emeralds in a broad setting of silver. The view was so enchanting that I unwillingly ceased gazing at it to resume the dry work of taking observations. Camden Harbour is somewhat disappointing, it seems, as we look down upon it, so small after those magnificent sheets of water Collier Bay, Doubtful Harbour, George Water, and others. From Camp 4 we passed to a hill about one mile south-east of Camden Harbour, 600 feet high, and then on our return route to Camp 6, half a mile south-east, where we noticed a remarkable geological formation—quartz veins through sandstone. At 4 P.M., resumed march 2½ miles west to the southern heads of Brecknock Harbour, and after passing very tolerable country formed Camp 7 in a well grassed and watered locality. During the night some heavy four-footed animal trotted past at no great distance from our camp, to the great terror of Peter, the pony. I am curious to know what creature it could be; it was evidently a heavy beast, and its motion I noticed very carefully, and can only compare it to a distinct trot. Butterflies abundant and beautifully coloured, but I do not catch as I cannot preserve them.

*July* 9.—At 8 A.M., *en route* passing over a particularly easy country, chiefly with a gravelly soil of quartz, ironstone, old red sandstone, and trap. Here and there this easy country was cut by belts of strong country with coarse grass, but still not so rough in any place that a bullock or horse team could not travel all the way. Passing south of the double-coned hill, we made a course east by south, cutting all the little streams that drain the MacDonald Range, under which we camped at noon on the most eastern bend of the Gairdner. Under the range there was fine grass and large timber; the river has permanent water; in some of the pools was a carpet of lilies in flower; palms abundant, water excellent, and characeæ and other water-plants numerous. At 3.30 P.M. resumed the march 4¾ miles to the first of the streams rising in the MacDonald Range and flowing into the Glenelg, over magnificently grassed downs, gently undulating, but elevated 240 feet above mean sea-level, which I proposed calling "Hampton Downs;" they divide the streams falling into the Gairdner and Glenelg. Exquisite palms all around our camp.

*July* 10.—To the Depôt camp. All the country we passed over is beautifully grassed, but as we approached the depôt the grass became coarser; the soil is a rich alluvium nearly the whole dis-

tance. We found all well in camp. The parties looking for land seem disinclined at present to leave a depôt party here, but this is a magnificently grassed and well-watered country, with a practicable natural dray-route all the distance from Camden Harbour to this depôt. The whole of our route during the past week is fringed by timber of sufficient size and in sufficient quantities for all building and pastoral purposes for many years to come; we have already seen 300,000 acres of land of the finest quality for grazing, and at present, although it is now drawing near to the close of the dry season, clothed with grass of the most luxuriant growth. During our march of this morning there were places where, as we rode along, we could not see each other for the grass; in fact the grass-seed was at least three feet above our heads. It is the opinion of us all that the lowest estimate of the carrying power of this district is a sheep to an acre, therefore 300,000 sheep might be fed upon it; but in this estimate of land we do not include the sandstone ranges we have seen, which, although so precipitous as to be impassable save on foot, are still well grassed and available to the depasturing of sheep, and in process of time, as the more easily traversed land becomes stocked, would naturally be included in the runs. But to what extent the ranges would increase the pastoral lands of the district north and north-west of the Glenelg, it is impossible now to conjecture; it is very easy, however, to foresee that in a short period after the settling of the country, ramblers in search of game, or shepherds would discover easy passes through them, and feeding valleys to their summits. Another matter worthy of notice—we have not yet seen one of the many poisonous plants, the bane of the south of this colony, and to eyes so well accustomed as ours to the various kinds, they would if here, before this, doubtless have become apparent.

*July* 11.—On board the vessel; found all the collections of specimens I had left behind excessively damp, and the botanical ones I fear spoilt. During the last night the mosquitoes prevented all chance of sleep, in spite of smoke or any attempts at covering ourselves up. In the morning a shooting party left for the lagoons on the south side of the Glenelg, returning at noon with a goodly supply of game. One of the silver-grey cranes measured 7 feet 6 inches from tip to tip of wing, and 5 feet 10 inches from toe to beak.

*July* 12.—A day of rest.

*July* 13.—Went to the depôt, as it is proposed to start this day on the south and west exploration; on our way up in the long-boat saw eleven alligators on the mud-banks, some we estimated at 6 feet, others at 25 feet in length. Left the depôt at 2.30. P.M. with two saddle and one pack horse, carrying a fortnight's provisions. By a direct course steered for Mount Lyell, distant

4¼ miles from depôt, and visible all the way; reached it an hour before sunset, camped and then ascended to the summit. It has changed its appearance very much since Lieutenant Grey described it, and is now clothed with grass and trees; from a clump of huge stones on the apex we had a magnificent view of the surrounding country, extending over the Prince Regent River on one side and the Glenelg district on the other.

*July* 14.—Left our camp at the foot of Mount Lyell and steered a course generally S. 20° E. until noon, 4½ miles. The first mile was over very rough but well-grassed country, with the largest timber we have yet seen, and water everywhere; the last camp was our first experience of water without palms, there replaced by three species of acacia. The second mile was over an excellent grassed and well watered country, the third and fourth the same, but larger timber; the last half mile was over sandy and rocky country very difficult to travel over, having deep creeks and water-holes equally difficult to cross. When we struck the Glenelg it was at a fine deep reach, one-eighth of a mile broad, with little current in it, and its sides were fringed with lofty eucalyptus and cajeput trees, with fine grass down to the water's edge. Many new flowering trees were passed to-day, and kangaroo seen several times. Palms everywhere around us. In the afternoon, after two hours' particularly difficult travelling both for selves and horses, we only made one mile, and camped in a gully running into the Glenelg; we ascended the hill, out of which the gully runs; it was nearly all stones piled loosely, and spinifex here and there, but with a fair proportion of feed. I was astonished to find a very fine acacia growing among the pile of stones on the top of the hill, sufficiently large to enable us both to climb it, and, sitting among the branches, to take bearings. Here are rapids in the Glenelg, which in the rainy season must afford a magnificent landscape, as the fall in the rocky bed is not less than 50 feet. Fish in the river and the water extremely good.

*July* 15.—*En route,* steering a general course of S. 20° E. After travelling an eighth of a mile we entered what we may well call "the Happy Valley;" this was a valley running to the southward, of no great breadth (say an eighth of a mile in the widest), clothed with a very carpet of green grasses. The first pines we had seen here fringed our track and formed, with the old red sandstone walls bounding the valley on either side, picturesque clumps of eights and tens intermingled with palms, acacia, eucalypti, and melaleuca, of great variety and beauty. A deliciously cool and clear stream of water flowed everywhere copiously along the valley; we disturbed birds of varied hue, but mostly of brilliant colours; one kind of parrot struck me as peculiarly beautiful, the head and tail of bright green, the wings of a silvery grey hue; pigeons were

numerous, but small; at the upper end of the valley two stately emus, at different intervals, gave us first an inquiring and suspicious examination, and then in turn afforded us an opportunity of observing their powers of retreating. The "Happy Valley" terminated in a happier circular plain of about half a mile diameter, covered with the most luxuriant grass, not less than three feet in height and perfectly level; this plain was bounded by timber of different kinds and a wall, broken here and there, of old red sandstone behind the trees; the first Banksias we met with grew here. From the plain we ran up a creek bounded by rocky walls to its source in the dividing range, the route being over a chocolate-coloured sandy detritus; the neighbourhood had been lately burnt, was easy to travel over, well watered and grassed, and had an abundance of fine timber. Our afternoon course was over exceedingly difficult country for three quarters of a mile, then, branching westward, to a gully running parallel to that of the morning, we continued our course over a similar country until we arrived at a large flat, where we camped for the night. Just before making camp we saw extraordinary proofs of the recent presence of some very large, and, I should say from the tracks, five-toed herbivorous animal; during the day we saw a large stone-coloured snake, black cockatoos, and numerous kangaroos.

*July* 16.—My companion went to the top of the range bounding the eastern side of the swamp, and on his return reported that the country S. 30 W. promised easier travelling, and we therefore started on that course. After crossing the Glenelg and a most important tributary, at a spot which we denominated "Rocky Springs," we camped. An entomological research produced me only 30 coleoptera, of three or four species; a beautiful white moth with red markings rewarded me. Native fires sprung up in all directions towards sunset; it is evident the aborigines are close to us.

*July* 17.—Ascended a hill 1300 feet high. There are between this range and the Prince Regent River three distinct high ranges; one about 12 miles S. 20° E. appeared clothed with grass of the colour of that on Mount Sturt, and apparently as coarse. All the country within this radius of 12 miles I should describe as second-rate compared with the country north-west of the Glenelg, but still it was well grassed on the strong ridges, and magnificently grassed on the flats; it is equally well watered, and possesses finer timber. The hill is singularly uninteresting in a scientific point of view, no specimen of any kind having been collected upon it except the cast skin of a small lizard; no flowers, no insects, except ants and flies; the latter are a daily pest except when travelling; a few butterflies alone gave colour to the eye; clumps of spinifex appear towards the apex.

*July* 18.—Returned to the last camp, taking a more southerly

route. Thence N. 30° 10′ W. to the Rocky Springs, passing through some rich alluvial flats, having on our left a stony range well grassed and timbered. We have several climatic nuisances—flies by day, mosquitoes by night, and ticks manifold both by day and night; beyond these trifling discomforts, the climate, since we passed the north-west Cape, may be described as heavenly; only just warm enough in the middle of the day to make shade preferable to sunshine, and the nights delightfully cool but not cold.

*July* 19.—Whilst gathering palm-leaves to make a fire, I noticed a very beautiful wasp's nest pedicillated delicately to the under side of the green leaves; I was almost too late, however, when I returned, to effect the capture of one or two specimens; they seemed quite indignant at the intrusion, and threatened dire vengeance if molested. The capture of one or two of the ringleaders soon caused the rest to retreat, leaving their city with its inhabitants, in every stage of waspdom from the egg to the larvæ, an easy prey to my spirit bottle. Started, and by picking our way carefully up and down the gullies crossed the Glenelg, by cutting down the palm jungle, after an hour's hard work, camped 1½ mile further on, having only accomplished 4¾ miles direct, at 1.30 P.M., owing to one of the horses having been severely cut the previous day. All the ground passed over during the last three days has been recently burned by the natives. The bed of the river here is drift sand, indicating a river-bed in the summer of 300 to 400 yards in width, fringed by lofty cajeput, eucalypti, acacia, and occasionally dense palm-jungle. I noticed one fine white gum-tree. After dinner I went upon an entomological tour about a mile down the rivulet towards the Glenelg, but with partial success only as to beetles, there being so few flowering trees and shrubs in blossom at this season. In places here the white ants are very numerous, and their hills are frequently from 5 to 6 feet in height with a diameter almost equal to the height.

*July* 20.—The period of sunrise here is a daily feast: a cloudless sky, not a zephyr stirring with sufficient force to move the smallest leaflet, and a temperature perfectly enjoyable, even clad, as we were, in our travelling garments, which are simply our usual under-clothing, boots, trousers, and outer Crimean shirt, a silk neckerchief, which serves as a cap at night, a light cloth cap, with calico cover cut after the Indian mode, with a well-projecting peak to protect the eyes from the noon-day glare, and a veil about 10 inches square rolled round the cap, except when flies and mosquitoes are troublesome; these, with stout leather gloves only worn on state occasions, such as breaking a road through prickly bush-rose vine, acacias, or palms, complete our toilet of every day and Sunday. Started at 9.15 A.M., and after crossing two broad reaches of water at 1 A.M. crossed our southern track and thence

pursued our route down the Happy Valley, whence we passed over 2 miles of stony ridges and 2½ miles of easy well-grassed country, and camped on the Glenelg.

*July* 21.—Travelled over easy-grassed country as far as Mount Sturt, where we were long delayed in crossing the Glenelg, and by a reedy swamp running into the broad stream near Mount Sturt; reached the depôt about noon. Went to the vessel to pack away specimens and returned with instruments for measuring a base line, and took lunar distances in the evening to determine the exact position of the depôt. Since our departure all hands at the depôt have been occupied in cutting grass for hay, any quantity of which is at present to be had for the cutting, and it is of good quality and in such profusion all around us that ships might obtain cargoes of it as quickly as it would be cut, made, and pressed into bales. One of the first objects that met our eye was a tolerably neat press, erected in the midst of the camp, after the manner of a primitive wool-press; close beside the press lay six wool-bales of well-pressed hay, and about a ton of loose. During our absence a good addition has been made to my geological collection, which now includes what I take to be a fair number of specimens of the chief geological treasures brought from the hills by the summer floods of past centuries; many are of a highly interesting nature, either from their exhibiting the general geological features of the district, or from some peculiarity of conformation of strata or crystalline arrangement.

*July* 22.—The party propose to send some of the hay on board to-day, from this I presume it to be their intention to reship some if not all of the horses, which I cannot think a wise proceeding, for these reasons: first, because a district of unsurpassed fertility has been found and traversed, possessing abundance of feed and water for half a million of sheep, together with timber in far larger quantities than will ever be required for building and fencing purposes; a district blessed with a climate which, at this season of the year, is a joy to live in, with evidences of continual and periodical summer rains of sufficient amount to warrant us in the supposition that this is no exceptional year of fertility, but that an annual supply of grass of a like quality and in no less quantity might reasonably be predicated; a district having a fine and securely land-locked harbour in Brecknock Bay, with a country of almost unequalled fertility immediately adjoining, and fit without road-making to drive a bullock or horse team over it at once so far as even to the very centre of the district: a district having a river leading from the southern harbour, in Doubtful Bay, to the very heart of the grazing country—a river I should describe as safe and easy to navigate with cargo-boat, or a small steamer, from George Water to the rapids, and south of the actual river-entrance

in the north-east corner of George Water, perfectly secure for vessels of any class or size, especially if the south-west opening of George Water into the sea should prove, on our return trip, to be wider and less tortuous than the entrance through which we sailed from Doubtful Bay. Here I must admit that although the *Flying Foam* came safely through the passage, and the actual river entrance from George Water, still the work was hazardous (doubly so then from the fact of ours being the first soundings taken there), but even now, viewed from the most favourable point, a work fraught with visible dangers to any vessels larger than cargo-boats of 10 to 15 tons. At 10.30 started with Mr. Aubry Brown to measure a base line south of Mount Yule. During the whole day it was exceedingly sultry; being on a low mud-flat only just above low-water mark, without wind or cloud, we certainly felt the heat more than on any day since we landed in the Glenelg district. After finishing our chain line and solar observations, we discovered a convolvulus with the leaves and vine dry and dead, twined round a mangrove; the seed was quite ripe; the signal for our recall sounded from the ship, the tide was then high enough for us to get on board without difficulty. Our usual mode of going on board from the mud-banks has been by a process, compared with which a mud-lark's trade on the Thames is clean work, much more pleasantly described than performed, but this is a favourable description of the process: after a toilsome walk along the northern margin of the mangroves we reach a spot where, at low tide, we are just able to wade through the mud and spots of water left by the previous tide, and then by a decidedly muddy and circuitous route reach a road cleared through the mangroves to the edge of the mud-bank proper, when, although we have a road-way paved with mangrove-logs, we sink up to our knees on a bluish grey mud of the consistency of dough, and in some places a man would sink over head in it if unacquainted with the geography, and then by a series of ungraceful evolutions glide alongside or into the boat to be put on board the vessel, objects to be carefully shunned and commiserated; we wash and change our garments and sit down perfect *bonnes bouches* for the mosquitoes. In early evening, that is by the liberal use of smouldering rags, we obtained a respite from the mosquito nuisance, but from that hour throughout the night an unceasing hum was kept up by clouds of these pests hovering about our heads, but wholly defeated in my case by the manner in which I was packed up in my rug on deck; as to sleeping below, of course no one has been so venturesome as to attempt it during the past month.

*July* 23.—This morning I found an entomological treasure in the shape of a tick upon my left arm: it was in the same condition as we usually find them—the head buried in the skin immediately

over a vein, and its body swollen with its stolen food; it was larger than those we found on the Upper Glenelg. I tried the experiment of making it disengage itself by putting the lighted end of a match to its body; but it required a second application before it would show any signs of relinquishing its hold. This individual seemed unfitted for the experiment of drowning by oil from the hardness of its epidermis; but other species, as soon as a drop of oil is placed on them, disengage themselves quickly, owing, I presume, to the closure of the spiracles by the oil and the consequent stoppage of their powers of breathing. As they are frequently met with in many parts of Australia, and as I am not aware of the existence of any recorded observations on their anatomy or habits, I think it will not be time thrown away to take measures to obtain as many species as possible and make some enquiries into their history, the more especially as I know no greater plagues to travellers in these parts of the world. It is not so much the immediate as the remote consequences that are to be dreaded, for if incautiously the creature be detached summarily on its discovery, or rubbed off by the hand, its presence being undetected, its head may remain in the skin and then there is formed a hard callous lump, which I have known to become a source of pain and anxiety for two years after the first formation. Towards sunset two of the horses and a party arrived from the depôt, and were got on board preparatory to leaving the river. I am lost in amazement at this resolve; for granting the cost of leaving a depôt here, I ask myself, can they expect to find 500,000 acres of land, in any part of the world, capable of carrying perfectly half a million of sheep, at a cheaper rate? However our exploration will open to some future occupants this tract of superb grazing country, certainly inferior to none in the world that I have seen, and I have travelled much. In the evening the whole party returned to the depôt.

*July* 24.—This morning an alligator was caught by one of the sailors: it was 6 feet in length, head 1 foot 4 inches, first pair of feet 2 feet 5 inches, second 2 feet 9 inches, circumference 2 feet, and weighed 80 lbs. I skinned and dissected the creature, preserving the cervical vertebræ, lungs, skull, and skin. In the afternoon the remainder of the horses arrived from the depôt and were got on board.

## FROM THE GLENELG RIVER TO COLLIER BAY.

*July* 25.—In the early morning the long-boat went to the depôt for the sheep, and returned at 8 A.M. when they were forthwith put in their pens. During the day I was employed in cleaning, preserving, and stuffing the bones and skin of the alligator, a tedious operation, as some of the smaller bones are so exceedingly thin that

the slightest cut would have easily passed through them. At dusk we left our anchorage and towed down the river to long. E. 124° 43′ 52″, S. lat. 15° 43′ 8″, and stuck fast in the mud at 9·45 P.M. We did not perceive this bank on our upward passage, or we might easily have avoided it and continued to use the tide for another hour. On reference to our chart of the river we perceive our track runs along the northern edge of the bank: as shown by the soundings this bank can scarcely be called a hidden danger, for it consists of a deposit of mud about a foot in depth lying on a smooth bank of sand, thus affording a safe berth to any vessel during the receding tide; but of course if the vessel were not somewhat flat-bottomed she would have a considerable list. For two hours before low tide we were left high and dry with the river running placidly on either side of us. This change of anchorage of last night was a boon appreciated by every individual on board —we were actually enabled to sleep with our faces uncovered. Just before leaving our anchorage a desperate attempt was made to capture a large alligator floating in the river like a log: one shot from a rifle was fired and the ball undoubtedly struck the creature somewhere, for by its rapid lashing of the water we can only suppose that it was in a flurry, at the very least; but, alas! when the vessel's gig and a numerous party reached the spot, no reward awaited them save the view of the still troubled water. One can imagine the creature, when aroused from its reverie by the leaden messenger, to give a look of intelligence around it, and on catching a glimpse at the advancing boat, to resolve, all things being well considered, to explore the bottom of the stream and recline its aching head on its customary mud-pillow, at any rate for a season.

*July* 26.—At 8 A.M. left our anchorage, and by dint of sail and towing proceeded down the river at a tolerable speed. At 11 A.M. ran aground on a mud and sand bank half a mile south-west of our anchorage of June 6: the vessel was so far fortunate enough in her choice of a berth, as to have avoided a mass of sandstone rocks and boulders, which at low water we found immediately east of us, and against which, if she had struck, an unlucky thumping would have brought us to a stoppage less easily than the mud did; moreover the rocky heap was a foot higher than the mud-bank, and the vessel could not have assumed so upright a posture during the interval before the flood-tide of the afternoon. The shoal patch I purpose naming "Sunday Shoal." At low water many of the party and some of the crew got over the side of the vessel to seek shells, &c.; they were so far rewarded as to find an abundant supply of hermit crabs, which were new to many of them. None of the shells obtained struck me as being very curious or new. The party on the bank spread far and wide over the ground in quest of Gle-

nelg treasures,—I cannot say the treasures of the deep, for when the vessel grounded the lead proclaimed ¼ less 1. Just before sunset the vessel, in swinging with the flood-tide, bumped and grazed upon the rocks in the bed of the river; there are not two fathoms on the rocks at high water. After sunset we sailed to a point in the river, long. E. 124° 42′ 10″, lat. S. 15° 45′ 34″, three miles from our anchorage of the 28th June, and then anchored to await the tide of to-morrow morning, so that we may have daylight to pass the narrows and rocky islands; it would be imprudent to attempt the passage in the night owing to the force of the tide. We observed at our last anchorage that there was a considerable set of tide out of the opening opposite to which we were anchored. This would argue some other communication of the river with the sea, besides that with which we are already acquainted: this, although a question of great interest, would be a matter, the solution of which would now be quite foreign to the object of the present expedition.

*July* 27.—Sailed at 7.45 A.M. with tide and wind north by east, in our favour; notwithstanding this it required the boat, manned with four hands, to keep way upon the vessel from time to time. Cast anchor in Maitland Bay at 11.20 close to the anchorage of the 28th June. Nearly the whole party was here engaged in securing a baobab-tree and collecting seeds. The inner part of the baobab set us all to work chewing away, some pronouncing it almost as good as cocoa-nut; but for my own part I think it tasted more like Indian rubber. At 8 A.M. sailed and passed through the channel between the two islands off the southern extremity of the bay and the main, with soundings all exceeding 10 fathoms. With a variable wind we proceeded down George Water until 1 A.M. Tuesday, 28th July, when both wind and tide leaving us, we anchored in 10 fathoms (mud), in longitude E. 124° 34′ 10″, latitude S. 15° 51′ 35″.

*July* 28.—After a night of the most refreshing sleep, so well appreciated by us after our steamed and mosquito bitten nights on the Glenelg, we arose to see before us what we desired in the south-west corner of George Water; namely—a far wider, shorter, and from this distance we judge, a safer outlet to the sea than the south-east channel, by which we entered from Doubtful Bay. Sailed at 11.15 A.M., calm; at 1 P.M. a breeze sprung up, and we began to beat towards the south-west passage, but at 3.15 P.M., just as we had sighted a series of native fires close by the shore, a loud grating noise—whilst I was making entry of the last sounding ½ 5—and the sudden stoppage of the vessel showed us that we were aground on some rocks, where in a few moments the receding tide left us at an angle of 30°, on a comparatively flat rock with deep water on either side. The master of the vessel left in the long-boat to examine the south-west passage, and after dusk he

returned, reporting a deep and safe passage, not as I supposed, to seaward, but into Doubtful Bay, not very far distant from the south-east passage. Just before sunset the natives on shore lighted up many fires, and gave us a "cooee," but whether of friendship or defiance I know not; however, we returned the salutation in like form, and continued this pastime for an hour or so, hoping to entice them, if they possessed canoes, to pay us a visit. On the return of the long-boat the propriety of landing and tying up some presents (we had brought looking-glasses and other trifles with us for the purpose) to the trees was debated; but it was thought generally, that the articles, when found, might be taken possession of with the idea that they had stolen them from us, and that the idea of our leaving them there intentionally as presents, would involve too complex a matter for their understanding. When the tide suits, which will be about 9 P.M., the master of the *Flying Foam* purposes to sail down the newly explored channel, so it is very improbable the natives will see us depart. About 9 P.M. set sail from the rocks, but the wind failing, had to tow the vessel down the south-west channel. It was a much safer passage from Doubtful Bay into George Water than the south-east one. The soundings were equally good, and its width on an average twice that of the other, whilst there was no dangerous navigation at all to be compared to the northern extremity of the south-east channel. Two points shown in the chart were exceedingly rugged, and there were many parts of the shores precipitous and some cliffs quite perpendicular. We reached Doubtful Bay in half an hour after midnight, and after cruising for some little time in search of a wind, anchored S.S.W. (nearly) of the south-west passage into George Water.

## COLLIER BAY.

*July* 29.—An immense whale (humpback) estimated at 6 to 10 tons, is sporting about the bay. From this anchorage the two mouths of the Glenelg appear to be in the positions indicated on Grey's chart, and the shores of the bay and adjacent islands to be moderately but not precisely correct. At 11 A.M. sailed with wind and tide into Collier Bay; the breeze lasted until after sunset and carried us well up into the bay, but then dropped and left us to the mercy of the tide, which drifted us back again to the entrance, from whence it is rather a pretty sight. It is a magnificent sheet of water; we sailed closer to the eastern shore than the western, as it was the wish of the party to land and examine the country sighted from Mount Lizard. What makes the bay so interesting as we sail along is the beautiful geological sections displayed every here and there by hills and cliffs; the distance of our course from the shore is too great to admit of more than a general recognition

of strata, but as I do not purpose accompanying the party on the preliminary exploration on foot, I promise myself a ramble along the shores, in the hope of an augmentation to my various collections. The country at the head of the bay is remarkably rugged: hills of very irregular conformation confusedly piled, with here and there a cone of graceful outline. Beyond all a lofty blue range towers over, whose summits are rent and split occasionally in a grotesque manner; lower down towards the level there is now and then a cubical block of old red sandstone standing quite bare, and, viewed at a distance over half a mile, looking very like a red brick house. The soundings up to the present time have all been good, the leadsman having on no occasion called less than 12 fathoms, and very frequently no bottom at 15 fathoms. Drifted at 8.20 P.M. into 20 fathoms water, and there cast anchor for the night. The moonlight is exceedingly brilliant here; some of our party seated on the deck have more than once enjoyed a game of chess by moonlight. This comfort of free exposure of face and hands to the cool evening air after the muffling up we had recourse to on the Glenelg, during the month of our river experience (this applies only to the river itself, mosquitoes being rarities in the bush a mile or so distant) becomes a boon we well know how to appreciate.

*July* 30.—At 6 A.M., left the anchorage of last night, and sailed till 8 A.M., when we anchored in Shoal Bay in 4 fathoms. Here the long-boat left with a crew of three, and three days' provisions, with a view to walk to some high hills and examine the country which appeared so promising from Mount Lizard. Some of those left on board landed on two of the islands for an hour or two's stroll in the morning. They found nothing worthy of note except an abundance of beans and numerous tracks of turtles. They noted well the spot, however, and intend to re-visit the place this evening in the hope of surprising one of these turtle visitors; it will be acceptable to us as a change of food. Close to the turtle-tracks a vast quantity of fine beans grow; they are now in every stage of development from the green pod to the perfectly ripe seed. So plentiful are they that we contemplate sending our spare hands who remain on board to gather some sacks full; our stock of vegetables has long since been exhausted. They observed recent tracks of large parties of natives, who beyond doubt assemble on these islands to feast on the produce of the sea. A few corals and shells were brought to add to my collection. About 6 P.M., the gig, with a crew, went to the turtle-bank, but after waiting an hour or so returned unsuccessful. The long-boat party also returned; the boat's crew had not taken sufficient provisions to last 24 hours from the vessel, and 12 of the biscuits of our land party were lost; hence the return. They report the bay they entered as much larger than

laid down on the chart; it was the bay to the east of Shoal Bay. They also found a river running into the south-east corner of this bay, with the first wide reach running about south-east. They did not get into this river for the reason above alleged. From a hill on the southern shore of the bay they sighted a large sheet of water E.N.E., which they thought might be Doubtful Bay, but on marking the bearings on the chart, it would appear to be a large sheet of water which would be found close to the opening opposite to the anchorage of this morning. The country described agrees so far with our distant view of it from Mount Lizard. They brought with them three specimens of the native canoes, which are a step, and that only, in advance of the single log so frequently used by the Australian aborigines. They (the canoes—not the aborigines) consist of three or four mangrove-sticks, about 6 or 7 feet in length, pegged together with pine. The ends of all the sticks are carefully sharpened, and only such sticks as are naturally bent to a suitable shape appear to be chosen; about the middle of the canoe there is a pine pin projecting 6 or 7 inches on either side, probably affording a similar support to the native mariner as a stirrup does to a horseman. Of course there is no attempt to make a bottom to the canoe, nor do the specimens brought show the least sign of ornamentation. There is a red ochreous stain to be detected upon them here and there, but we account for them as having been communicated from the persons of the natives coloured with *wilgi*, or they may possibly have been designedly coloured with *wilgi* (red ochre). They also brought the first specimen we had seen of a *Hakea*, some few seeds, coral, and other natural objects, but nothing remarkably interesting.

*July* 31.—At 7 A.M., the long-boat, with an exploring party of six, taking with them a week's provisions, left the vessel to examine the river supposed to exist in the south-eastern corner of "Secure Bay," which latter is laid down in the charts about half its real size. One of our party and myself, an hour afterwards, left for the turtle islands; we were, as we expected, too late for the turtles, but their recent tracks upon the sand and their holes were numerous. At the upper part of the sandy beach there were the remains of an aboriginal festival. Many old fire-places, cracking stones, break-winds, the soft shell of many a turtle's egg, with fragments of a turtle's carapace, were noticed about the ground. Near our fire we observed a portion of a native canoe; it was the thicker end of one of the sticks, standing in the place of the ribs; from this specimen we suppose the natives to be in possession of sharp-edged tools, probably made from the same greenstone which they sharpen their spears with, because the end of the stick was formed by clean even cuts, with no sign of scraping; but as they do not require boring

tools, the mangrove-sticks being evidently chosen when dry and capable of being fastened by driving a sharpened pine peg through them, as a carpenter would drive a nail through boards, they seem to be unacquainted with the use of them. Moreover, the pine pegs drive easily through the dry mangroves, and it is only rarely we find the sticks split by the process. On the same sand-patch we found large quantities of the beans, whose creeping runners are of enormous length, some exceeding 40 paces. As the seed was nearly ripe I collected 1½ pint, and gathered a few of the green pods hoping to be able to dry and preserve them. Growing along with the beans was a convolvulus whose shoots equalled theirs in length; a small quantity of its seed I also preserved; we could only find one flower, and that not larger than that of *C. major* grown in England; its colour was of a purplish pink, with the usual deeper tinge of colours towards the centre of each petal. We then walked up a valley with a water-course having deep stony holes but no water, nor were there any palms to indicate permanent water even at a depth below the ground, so that we imagine the island to be surface-watered, and that alone. When the natives visit this island in the dry season to enjoy a turtle feast they must bring the water from the mainland in shells; for these latter we sought carefully but unsuccessfully.

The formation of the island is old red sandstone and free-stone, the latter of excellent quality; in one or two places the strata are vertical, but in general the dip is south at an angle of about 15°. Instances of *scoria* were occasionally met with, and between the water-marks, here 37 feet distant, the formation was evidently volcanic. The trees were not by any means stunted, the eucalypti attaining a height of 50 feet and upwards, but all gave evidences of occasional strong winds prevailing which caused the trunks to grow in anything but a straight line. The fact was the more apparent to us because we had noticed in the Glenelg district how very straight all the timber, from the smallest to the largest, grew. The grass was thin but of good quality. The surface of the ground being covered with loose stones we merely walked to the top of the hill, whence we enjoyed a magnificent view of Collier Bay and our good little vessel at anchor, a mere speck on the water. We then returned to the sandy beach and spent a couple of hours in examining the shells and corals; there were but few good shells, but the specimens of corals were numerous, and my collection included more than an average number of species. Foraminifera are rare in the drift-sand. Towards noon we returned to the boat; *en route* to the ship we espied, coming rapidly towards us, a dark object which from its direction of progress through the water we thought might

possibly be a native crossing the bay on his canoe. As the line of travelling of this object did not exactly coincide with our course, we at once steered towards it in the hope of at least witnessing the mode of propelling and guiding the singular craft used as a canoe. Great was our disappointment to find our native and his canoe to be only the roots of a large tree floating steadily, trunk downwards, through the water; nor was it a little provoking to find a white spot on the top, on which we had laid good stress in our predication, turn out to be a sea-bird perched there and enjoying a quiet sleep until the noise of our approach awoke him, made him stare a little at our intrusion, and then take to flight in utter consternation.

At dusk the long-boat and exploring party returned. They had passed safely through Secure Bay and entered the river passage, which is very narrow, has an island in the middle and perpendicular cliffs on both sides, and a tide which ebbs and flows with wonderful force; passing up the reach they had come to a second narrow passage of greater velocity and danger than the former. Here whirlpools were formed by the flowing tide, and only by the united strength of all on board was the boat prevented being drawn in; fortunately the passage was clear of rocks, for the velocity was estimated at 20 miles per hour, and of course the slightest check or impediment would have dashed the boat to pieces, and certain death alone would have stared the explorers in the face. This hurling of the boat through the second passage, as through a sluice, terminated in the discovery of a large sheet of water, equal in extent to George Water, bounded on all sides by mangrove banks and creeks. With difficulty effecting a landing, they ascended a high hill of a dark purple coloured granite, on which only scattered tufts of spinifex and stunted bushes grew, the rest was all bare granite boulders and fragments, to walk safely over which the greatest attention to the footing was every moment necessary. From the summit no view was obtained, save of numerous cones and bluffs of granite equally bare and difficult to walk over. The large sheet of water E.N.E. of Secure Bay was not again sighted. On consideration, it was thought prudent to return to the vessel at once and proceed to Roebuck Bay, as the corn and water on board the vessel would not last more than a month from the time we left the Glenelg, and to reach the country we sighted from Mount Lizard from this point would certainly make a sad inroad into the stock of provender and water, and these failing, nothing could be done save the killing and throwing overboard some, if not all, of the horses. Therefore, at 8 P.M., both boats were hoisted on board, and all made ready to sail from this bay, *en route* to Roebuck Bay, by to-morrow morning's tide. The tide here to-day rose 36 feet.

2.—*Report for the Information of His Excellency the Governor of Western Australia, and the Promoters of the North-Western Expedition of* 1864, *on the Voyage and the Resources of the Districts Explored.**

THE voyage from Champion Bay to the anchorage in Brecknock Harbour occupied 25 days, owing to a succession of light and contrary winds after passing North-West Cape. During this period two incidents only call for especial remark; namely, a visit to Bedout Island, and the discovery of a dangerous reef.

The visit to Bedout Island was resolved upon in consequence of adverse winds. From careful observations made, the position of the highest land seems to be in longitude E. 118° 56′ 20″, latitude S. 19° 40′ 45″; according to the charts, longitude E. 119°, latitude 19° 36′ 20″; according to Norrie's list, longitude E. 118° 52′, latitude S. 19° 29′. These data show an extreme difference in the position of the island amounting to 8 minutes of longitude and 11 of latitude. Ships sailing in this direction, therefore, should approach the island cautiously. The island is about a mile in length; its mean breadth is half a mile. It appears to be formed as islands are usually formed in the centre of circular coral-reefs or atolls; it is merely a heap of coral-sand piled up upon a sandstone point of ancient elevation, whose dip is about 15° to the westward. This has gradually become clothed with soil capable of supporting a coarse and stunted vegetation. The rock forming the basis of the island is a trappean sandstone composed of particles derived from the decomposition of greenstones and basalts, consisting chiefly of feldspar and hornblende grains, devoid of external crystalline form, with which are mingled quartzose grains and mica-flakes derived from other sources. The diameter of the encircling reef is about 3 miles; the space between the reef and the island is not more than 6 or 7 feet below low-water mark, in any place. There was no water upon the island. The anchorage 3 miles to the southward of Bedout Island, in 6 fathoms at low water, is good. High tide at full and change of the moon occurs at 10.50 A.M. Rise of tide (spring) 24 feet. The island is at present the resort of pelicans and turtles.

On Thursday, the 29th of March, we sighted Caffarelli Island towards sunset, and sailed a course midway between that island

* This Report accompanied the narrative of a second expedition, in which Mr. Martin was engaged, in 1864, having the same objects as that of 1863, namely the discovery of new tracts of pastoral country in North-Western Australia. The commander of the expedition was Mr. F. K. Panter.

and the Brue Rock. But at 8.30 P. M., it being very dark and the weather threatening, we shortened sail; before this was quite accomplished we struck upon a reef. After striking, the vessel drifted into 25 fathoms water. At 8.45 P.M. the anchor was let go, with 60 fathoms of chain. Half an hour afterwards it became necessary to cast a second anchor, with 60 fathoms of heavier cable. During the night a gale from the S.S.E. gradually sprang up. At noon, on the 30th March, the smaller of the two cables parted, whereby we lost the kedge anchor and 70 fathoms of chain. The starboard anchor, weighing 12 cwt., with 60 fathoms of chain, dragged for about 30 minutes, when, just as the preparations were made to unshackle it and try what sails could do, it held; nor did the most violent bursts of the gale again start it. This reef is not laid down upon the charts. The point of the reef where we struck is between 5 and 6 miles from the westernmost point of Caffarelli; the island bearing E.S.E. The reef, on its northern and southern sides, is of a flattened horseshoe shape, and it extends as far as we can see towards Caffarelli. It is awash at three-quarter flood-tide. According to the charts there should be a passage of 14 miles here, between the Brue Rock and Caffarelli, with soundings from 15 to 25 fathoms.

## THE DISTRICT OF THE GLENELG; CLIMATE, EXTENT, PASTORAL RESOURCES, AND GENERAL CAPABILITIES OF THE SOIL.

Partially surrounded by sea and deeply indented with noble harbours, this district, so far as longitude E. 125° 15′, may be said to enjoy a sea climate. The two periods during which meteorological observations have been made are far too short to admit of any precise conclusions on climatological questions even with respect to the particular months during which they were recorded; but as they do not differ greatly from results which might have been predicated of the district, taking its geographical situation alone as argument, they may be of some slight value, although, doubtless, they will have to undergo many alterations and corrections hereafter. These observations, together with our experience of the weather and the appearance of the country, rivers, and vegetation, all confirm the supposition that there are two rainy and one dry season in the year. The first wet season commences about December, and as we find the country everywhere clothed with the richest vegetation of about a month or six weeks' growth, whilst young leaves of such trees as the eucalypti are parched with the sun, it is probable the first and heaviest rains end in February; to these succeeds a period of warm clear weather lasting until the

end of March, when the sky again becomes cloud-bearing, but at this season with thunderstorms only. The mornings of April were almost always cloudless, or with high cumulus and cirrus of small amount; but in the afternoon or evening dense banks of cumulus appeared generally upon the eastern horizon, working up against a westerly or sea breeze, and terminating nearly every day in a thunderstorm with rain. These storms rarely lasted more than an hour; they travelled quickly. In the months of June and July the sky is again cloudless, and the various grasses ripen slowly: the heat of the noonday sun being tempered by exceedingly heavy dews and cool sea-breezes. On one of the hottest days in July (19th), 1863, sitting in the sun or in the shade during midday bivouac was a matter of indifference, although the thermometers at the time stood at 122° in the sun and 94° in the shade, at a distance of 45 miles from the coast-line and at an elevation of only 200 feet above mean sea-level. This, the hottest season of the year, lasts until the heavy rains in December. During the latter wet and the succeeding dry seasons the mean temperature appears high; this is caused by the high readings of the minimum thermometers: they seldom register less than 80° in April and 65° in June and July, yet the nights rarely feel oppressive. Lightning to the east and north-east occurs nearly every night in March, April, and May. In June and July the days are bright and cloudless: the nights cool and refreshing. The health of the party has in no case suffered from climatic causes; slight inflammation of the conjunctiva has attacked a few who have been subjected to unavoidable exposure; there has been one case of diarrhœa, and one of dysentery,—both yielded to a single dose of chlorodyne; and one attack of fever, of a typhoid nature, which was successfully treated with quinine.

The mean atmospheric pressure, temperature, &c., is shown in the following Table:—

| Date. | Mean Atmospheric Pressure. | Mean Temperature (shade). | Mean Maximum. | Mean Minimum. | Mean Diurnal Range. | Mean Solar Radiation. | Dew. | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mean Dew-point. | Mean amount of Dew, 1-10. |
| 1863. | Inches. | | | | | | | |
| June .. | 30·181 | 80·2 | 86·2 | 65·7 | 20·5 | 14·2 | 66·2 | 4·2 |
| July .. | ·061 | 83·3 | 91·8 | 65·3 | 26·2 | 22·9 | 63·7 | 3·3 |
| Aug. 18 | ·153 | 74·7 | 78·5 | 66· | 12·4 | 19·4 | 65·8 | 2· |
| 1864. | | | | | | | | |
| Apr. .. | 29·989 | 87·5 | 90·4 | 78·1 | 12·1 | 20·4 | 79·4 | 2·2 |

The hygrometric conditions, &c., are detailed in the annexed Table :—

| Date. | Hygrometer. | | | | | | Monthly Means. | | Total Rain in Hours. | Mean daily amount of Cloud, 0–10. |
|---|---|---|---|---|---|---|---|---|---|---|
| | 9 A.M. | | 3 P.M. | | 9 P.M. | | | | | |
| | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | | |
| 1863. | | | | | | | | | | |
| June .. | 71·3 | 77·9 | 72·6 | 82·6 | 72·2 | 80·2 | 72· | 80·2 | 1·7 | 2·12 |
| July .. | 68·6 | 75·9 | 72·6 | 88·6 | 73·5 | 85·4 | 75·5 | 83·3 | 0·0 | 0·57 |
| Aug. .. | 70· | 75·2 | 69·9 | 75·5 | 68·4 | 75·7 | 69 4 | 74·7 | 0·28 | 2·8 |
| 1864. | | | | | | | | | | |
| Apr. .. | 81·4 | 84·2 | 84·1 | 89·7 | 83·2 | 87·7 | 82·8 | 87·5 | 9·7 | 1·8 |

The direction of the winds, reduced to eight points of the compass, and the force estimated by the Beaufort notation from 1-12 (observations being made at 9 A.M., 3 P.M., and 9 P.M.) are recorded in the Table subjoined :—

| Date. | N. | | N.W. | | W. | | S.W. | | S. | | S.E. | | E. | | N.E. | | Calms. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | Force | No | Force | No. | Force | No | Force. | No | Force | No | Force | No | Force | No | Force | |
| 1863.—June . | 1 | 1 | 4 | 13·0 | 5 | 15·5 | 4 | 8·0 | 5 | 20·0 | 11 | 39 | 6 | 28 | 21 | 57·0 | 18 |
| ,, July . | 1 | 1 | 5 | 5·0 | 5 | 13 0 | 1 | 0·5 | 2 | 3·0 | 2 | 2 | 3 | 7 | 27 | 54·5 | 47 |
| ,, Aug. . | 1 | 4 | 3 | 10 0 | 5 | 26·0 | 7 | 17·0 | 1 | 0·5 | 18 | 68 | 6 | 17 | 5 | 14·0 | 2 |
| 1864.—Apr. | 5 | 7 | 10 | 24·5 | 21 | 30·0 | 4 | 7·0 | 4 | 8·0 | 5 | 6 | 4 | 4 | 8 | 27·0 | 29 |

Mean daily force of wind, 1-12—1863, June, 2·42; July, 0·5; August, 3·3; 1864, April, 1 3.

The extent of the known portion of the Glenelg district—that is, from the meridian of E. 125° 15′ to the sea-coast, and from the parallel of S. 16° 15′, to the latitude of Camden Harbour—includes only 2925 square miles; of which area, deducting one-third for stony ridges, an excessive amount, and the sea-inlets Doubtful Bay, George Water, &c., 1,000,000 acres are suited to the depasturing of sheep. Of these 1,000,000 acres, about 100,000 acres are adapted to the cultivation of rice and similar grain; 250,000 acres are especially favourable to the growth of spices, sugar, tea, and coffee; even cereals at high altitudes, and at certain seasons of the year, might be grown at any rate in sufficient quantities to meet the requirements of a pastoral and agricultural population. It is essentially a wool-growing country; it would be difficult to conceive a more luxuriantly grassed and watered territory; at the very lowest estimate it would carry a sheep to an acre, but in some picked spots there would be no risk in quadrupling that number of stock per acre, especially if sheep-farming were here practised with such intelligence as may be found in the tropical and subtropical districts of the Eastern Colonies of Aus-

tralia. The district, however, is neither fitted for cattle nor horses, except they be paddock-fed.

The islands westward of Brecknock Harbour, although quite as stony as the Glenelg district, are superbly grassed and watered. Augustus Island contains 56,000 acres of pastoral land, after deducting 0·4 of its whole area on account of the deep bays with which its shores are indented. Byam Martin's and Heywood's islands give 20,000 acres more. There are, therefore, about 80,000 acres of the richest pastoral land upon these islands, capable of carrying 80,000 sheep. All this country is so superior in grazing capabilities to the best districts occupied in the southern parts of Western Australia, that it is difficult to institute a comparison.

*Mineral Resources.*—Excluding building materials, the chief mineral resources are copper and iron.

1. *Copper.*—Indications of copper-lodes are to be met with in several parts of the Glenelg district; whether these lodes will be found hereafter to yield sufficient quantities to be profitably worked remains to be seen. Other specimens are collected than appear in the following list; but as the means of identification are not now to be obtained, their examination must be made at some future time:—

*a.* Bornite—East base of Mount Lookover.
*b.* Remolinite—Ditto.
*c.* Lettsomite—Beach of Brecknock Harbour.
*d.* Liroconite—Mount Double Cone.
*e.* Sand containing *Erinite*, a dystomic Habroneme Malachite —Beach on Camden Peninsula.

2. *Iron.*—Hydrous oxides, veins of both crystalline and amorphous iron-ore, together with nodular masses of specular iron-ore, highly crystalline and of considerable size, occur abundantly throughout the district. In Brecknock Harbour, at the base of Mount Lookover, and in the summer bed of the Glenelg, vast quantities of these examples may be found; scarcity of manual labour alone can prevent these ores of iron from becoming an important resource to the Glenelg district when occupied. Titaniferous iron-sand occurs plentifully wherever the formation is either basaltic or sedimentary; it is even found largely predominating in soundings of from 10 to 15 fathoms, at a distance of several miles from the coast-line.

Of the existence of an extensive gold deposit there is no evidence. From the discovery of exceedingly minute particles in the mud of the Glenelg River, and from the finding of a single specimen of nagyagite, an auroplumbiferous telluret, search, if made, should be directed towards the source of the Glenelg River

and thence southward as far as the FitzRoy River and the "provincia aurifera" of the old charts.

Precious stones will not be found in sufficient quantity to be of economic value; indifferent specimens of topazes, sapphires, zircons, rubies, agate, &c., will reward the seeker in almost any streambed; more rarely beryl, chalcedony, porzellanspath, obsidiam, and flint, will be found.

*Building Materials.*—The principal building stones are basalt and sandstones of various kinds, micaceous, argillaceous, and pseudo-crystalline. The latter, as it has no tendency to split in one direction more than another, may be termed a freestone: it is nearly white in colour, and can be procured in vast quantities upon the surface. The argillaceous variety is a flagstone well fitted for street-flagging, steps, &c.; it would likewise be found effective in ecclesiastical architecture.

Limestone yielding lime for building purposes is found in several localities; the specimens obtained from the range of hills to the westward of George Water contain the highest percentage of lime. In the district of the Upper Glenelg there are fine varieties of crystalline limestone of the saccharine kind, together with large deposits of a true magnesian limestone of a pearly lustre. Until an accurate examination of the palæontological contents and petrological relations of these limestones be made, their precise value cannot be more exactly determined.

*Indigenous Vegetable Productions.*—The following is a very imperfect sketch of the resources which the indigenous vegetation furnishes to this district. In grouping these according to the products afforded by them, the variety, abundance, colossal size of many and the durability of some, first attract the attention. By far the greater number of trees, valued for their timber, may be included among the Eucalypti, several species of which here attain a height but little inferior to the *E. globulus*, or bluegum-tree of Victoria. The flooded gum-tree (*E. rostrata*), the white gum (*E. acervula*), and the ironbark-tree (*E. resinifera*), are all to be found here in situations where, although too distant from the coast to export, they will prove invaluable to the future settler. Other species of Eucalypti, *e. g. E. aspera*, *ferruginea*, *citriodora*, *aurantiaca*, *phœnicea*,—besides their notable service in the bush as ample shade-givers, will all prove useful woods to the settler and to the artisan.

Upon the dividing ranges between the Prince Regent's River and the Glenelg, and in many other localities, the *Callitris verrucosa*, a pine not unfrequently met with throughout the interior of the Australian continent, from Victoria westward and northward to Champion Bay, Shark's Bay, and Arnheim's Land,—here, in the above-mentioned district, attains a size rendering it an object of

great value. It is fitted for all the usual purposes to which deal is applied in buildings generally, and it occasionally reaches dimensions that suffice for the making of masts and spars of moderate size. The wood is nearly of equal value with the well-known *Dammara australis*, or Kauri pine. Perfectly straight trees of the following admeasurements are common:—Circumference near the base, 8 feet; 5 feet from the ground, 7 feet; approximate height of the whole tree, 100 feet. Sir George Grey speaks of this tree (vol i. p. 275) as "fit for the purposes either of building or making spars for vessels;" he adds, "it is abundant and good, and could be readily and cheaply exported, if they were cut in the vicinity of the streams, and floated down to the sea in the rainy season, whereby all land carriage would be avoided." This Callitris is frequently associated with the *Araucaria excelsa* on the higher ranges both inland and on the sea-coast.

A melaleuca, very closely allied to if not identical with the *Melaleuca leucodendron* of India, from whose leaves the cajeput oil of commerce is extracted, grows abundantly, and attains an enormous size. There are many other trees yielding timber in every respect suitable to the requirements of the cabinet-maker, whether of plain or ornamental works.

*Fruits.*—Amongst the edible indigenous fruits, those of the "quandang" or native peach-tree (*Santalum preissianum*) deserves first mention: the fruit, notwithstanding its thin pericarp and strongly acidulous taste, is grateful and largely available for food. Other fruiting bushes of the same order (*Santalaceæ*) yield berries of a pleasant flavour.

Three species of Cissus are found: two run along the ground or entwine amongst shrubs, the third is arborescent. All bear fruit in size, appearance, and flavour like the small black cluster grape, and in bunches from ten to forty. The Baobab-tree yields a drupe as large as a cocoa-nut: the pulp and seeds of this fruit are very palatable; the bark and spongy inner wood, when soaked in boiling water, afford an agreeable mucilaginous drink not unlike maccaroni in taste. These trees attain an enormous diameter (50 feet in one instance), but they rarely exceed 25 feet in height. The young leaves and seeds of the palm fruit are of an excellent flavour: when green the seeds or nuts are not dissimilar to the English filbert.

*Native Vegetables.*—Amongst the indigenous plants available as culinary vegetables the fine bean, which grows so abundantly on the sand-hills of the coast, offers, when boiled, a nutritious diet: as a species it is as yet unnamed. The pea, *Abrus precatorius*, is plentiful all over the district: its valuable properties as a legume are recognised even by the aborigines. Horses eat greedily the branches, ripe seeds, and leaves. Several herbaceous members of the small family *Basellaceæ* may be regarded as a substitute for

spinach. The amylaceous roots of the Dioscorea, "warrein," and Typha, "yun-jid" or "adjico," are here, as in the southern parts of Western Australia, important articles of vegetable food of the natives.

*Fibres.*—The lemon grass, *Anatherum schœnanthus*, is pretty generally distributed throughout the district: this and one of the Liliaceæ, not unlike a dwarf *Phormium tenax*, yield a fibre from which the aborigines manufacture a strong and well-made twine. But of all the indigenous fibre-yielding leaves that of the palm deserves especial examination: it is a species of Livistonia growing in or near to every stream; its leaf, even if the fibre prove useless for cordage, will be valuable for the manufacture of hats, umbrellas, &c., suited to the climate. It might even be employed in the making of any coarse kind of paper.

*Medicinal Plants, Gums, &c.*—In this division of the indigenous vegetable productions, little can be safely predicated until opportunity has been afforded for an investigation into the medicinal properties of the plants already discovered; which, doubtless, form a very inconsiderable number of this class within even the limited area explored. The abrus and the anatherum, the pea and the lemon grass, as of most frequent occurrence, may be considered first. From the roots of the former we expect a perfect substitute for liquorice in every respect; from an infusion of the leaves of the latter, we know, from Indian experience, we can obtain a tea acknowledged to be stomachic, tonic, and useful in dyspepsia. From the convolvulaceæ, one species of which is included in the genus Ipomæa, we may extract deoretin, affirmed to be identical with jalapin; from a second species, of the genus convolvulus, scammony or a cathartic resin of equal value may be prepared from the expressed juice of its roots and stalks. From the root-stocks of the typha, extracts astringent and diuretic are obtainable. An elastic gum, something like Indian-rubber, and gum tragacynth, have been found. Sandaric resin can be procured from the pine and gum-resins of various descriptions from several of the eucalypti.

The bark of some of the trees indigenous to this district will yield a tonic and stimulant, depending on the presence of an alkaloid, which there is every reason to believe will make them become an article of export ere many years. The unlimited quantities of the melaleuca may be expected to produce an oil not inferior to the cajeputi oil extracted even by the simple Indian process. There are but few genera of the myrtaceous trees and shrubs from whose leaves and flowers we fail to extract a greater or lesser quantity of essential oil—aromatic, volatile, though somewhat camphoric.

As perfume plants the *Chamælaucieæ*, the *Rutaceæ*, and the *Labiatæ* abound in species; but to what extent they will prove of value for perfume distillation is is difficult to foresee. Lastly, the

Acaciæ, producing flowers in the utmost profusion (especially the large species fringing the upper Glenelg and nearly all the fresh-water streams of the district), possessing such powerful and agreeable odours, may be indicated as proximate objects of commercial value when this luxuriant country shall become the home of an intelligent people.

*Animal Products.*—To the geological character of the land its almost universal pre-oolitic fauna may be traced. Here, as elsewhere throughout the Australian continent, the pouch-bearing mammals, Marsupiata, rank next to man, so far as the development of their physical organization is concerned. These native animals, particularly the larger species of the Macropidæ, are extremely numerous in the Glenelg district: the skin of the *M. major* and the *M. laniger*, or large red kangaroo, as well as the skins of the smaller varieties, will form no mean item in the resources of the early settlers; whilst these fur-clad skins are regarded as articles of commerce, the value of the carcase of the animals, as excellent meat, must not be wholly ignored.

Of birds, which are numerous both as to species and individuals —the emu, geese, ducks, the native turkey (*Otis Australasianus*), the "ngowoo" or native pheasant (*Leipoa ocellata*), the jungle-fowl (*Megapodius tumulus*), the lyre bird (*Menura superba*), and very many others, may be mentioned as valuable either for their flesh, brilliant plumage, oil, or eggs.

The waters of the district, both fresh and salt, are rich in products which await enterprise alone to raise them. Foremost amongst these ranks the dugong (*Halicore*), a marine herbivorous animal included in the Cetacea, observed in both Doubtful Harbour and Camden Sound: its flesh alone, which is not unlike beef, would make it a welcome visitant; but regarded as the source of an invaluable oil, superior in a nearly twofold ratio to the best cod-liver oil, its annual visit would give rise to a fishery attended with greater profit, outlay and other things being taken into account, than that of the sperm oil. The pearl oyster of commerce, the species valued for its nacreous substance, is undoubtedly to be found here plentifully, for the aborigines who would not be likely to undertake any excessive labour to procure them, very commonly wear them as an ornament suspended round the neck. The *Tridacna*, a conchiferous mollusk, found upon any point of the coast between North-West Cape and the Prince Regent's River, might be included in the pearl-oyster fishery; for although its shell has no valuable nacreous lining, in it pearls of great beauty and of considerable size are not unfrequently obtained. The trepang fishery could not be profitably carried on by Europeans. Whales and seals have been more than once seen within the harbours of this district. There are fine beds of oysters for the table in Brecknock Harbour: turtles,

crabs, cray-fish, &c., abound. Deep-sea fishery would in all probability be a profitable occupation. The fresh-water streams teem with fish of large size and of excellent flavour.

*Harbours, Rivers, and Internal Communication.*—The district of the Glenelg is especially rich in bays, river-harbours, and sheltered anchorages. Along its western shore, from Collier Bay to Camden Sound inclusive, a vessel may at all times select a safe position with good holding ground in 15 fathoms water, and shelter from either the islands or the great coral-reef known as Montgomery Shoal. Doubtful Bay into which the Glenelg flows after receiving the Gairdner and the Fish Rivers, both considerable streams, and almost an innumerable host of minor tributaries, any one of which in the settled districts of Western Australia would be called a river—is a magnificent sheet of water, 9 miles in length from north to south, and 6 miles in breadth from east to west. Although in the summer vast quantities of water may from all sides pour into the bay, and the tides gain additional force thereby, yet as it is thoroughly protected from every wind and from a heavy sea by a range of islands and reefs to seaward, and the natural breakwater of the Montgomery Islands and the coral-reef, 14 miles still further to the westward,—as the holding ground is of the very best,—and as there is an abundance of room in which to work the largest ship,—Doubtful Bay, when this portion of the Australian coast is colonised, will prove a harbour of refuge second to none. From the great rise and fall of the tide also, 36 feet, this bay is a good site for works necessary to the repairing of ships. A better terminus to the system of Australian telegraphs, when connected with those of Europe and Asia, it will be difficult to find. About the centre of a large mangrove-swamp on the eastern side of the bay, there is a red conical hill, which vessels entering by "Foam Passage" should get in a line with the centre of the passage; at a distance of 2 miles westward of "Foam Passage," the summit of the red cone will just appear above the horizon within the bay (bearing true east by south); this course should be kept for $2\frac{1}{2}$ miles within the bay when Success Channel, the western entrance into George Water, will bear due north. The anchorage is safe anywhere within the bay; but in the vicinity of the spot indicated by the above bearings, a vessel at anchor will feel the tidal effect to a much less degree than elsewhere. There is but one known shoal within the bay, and that is situated at a distance of 4 miles from the red cone, on a line bearing N. 31° W. from the hill. At spring-tides this sand-bank was seen dry at low water. Soundings through "Foam Passage" and to the anchorage recommended are not less than 10 fathoms at low water; sand and mud bottom. Wood and water are to be had without difficulty in Doubtful Bay.

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Brecknock Harbour, area nearly 20 square miles, is so thoroughly land-locked that a ship once at anchor, need fear no wind. The coast line within the harbour is everywhere indented with beautiful bays. There are several picturesque islands, on nearly all of which there is fresh water; every valley of the main has its rippling brook of the purest water running down to the beach. Ships entering from Camden Sound have but two dangers to avoid; one is the bank extending northwards from the pinnacle rock,—the other is the rocky bar between Careening Island and the circular reef. Until further surveys have been made, Roger's Strait is considered a very dangerous entrance on account of the reefs, and Camden Harbour a hazardous anchorage by reason of its terrace-like bottom, which at some tides has not more than half or three quarters of a fathom of water. Brecknock Harbour is an excellent place for watering ships, and drift-wood is abundant near the line of high water; but timber, fit for spars and the repairs of ships, grows at too great a distance inland to be available.

Vessels entering from Camden Sound should do so only with the flood-tide and with a fair wind; the rocks to the south-west of New Island, to be seen at all times, may be passed in mid-channel; but on sighting the Pinnacle, which is close to the southern shore, a course about one-eighth of a mile distant from New Island will command the deepest water, running from 13 to 14 fathoms at the narrowest part of the entrance; when the Pinnacle bears south, a course E. 10° N. may be sailed for 2½ miles, when the northern entrance opens out into Camden Sound, bearing north-west, all bearings true; thence, a course E.N.E. of 3 miles may be steered, with 6 and 7 fathoms of water, either towards Green Island or Camden Harbour. Vessels above 100 tons register may select any spot within these limits, and obtain safe anchorage. Vessels of less than 100 tons register, with a draught of about 10 feet, after crossing the rocky bar north-east by north of Careening Island, may find a perfectly secure anchorage, anywhere in mid-channel, as far as the entrance to Camden Harbour, with not less than 3 and 4 fathoms of water; all these soundings are at low tide. For beaching a vessel on a soft bottom, it would be difficult to find a better spot than the sand-patch on Careening Island; whilst if a hard even bottom be desired, for repairs of keel, &c., the deep bay whose head bears south-east from Mount Lookover, distant half a mile from the base of the mount, will be found convenient and safe. The time of high water within Brecknock Harbour, at full and change of the moon, or the Establishment of the Port, is at noon; that is 40 minutes later than in Camden Sound. Spring rise of tide 30 feet; neap, 12 feet. The tides rush through the entrances with great force; it would not be

advisable for any vessel to attempt the passages under sail, with an opposing tide.

"Success Channel," the north-west passage from Doubtful Bay to George Water, is safe for vessels of any draught, provided the flood-tide be made use of; and anchorage in George Water or Maitland Bay is good; thence, to the lower rapids of the Glenelg, distant 40 miles from "Foam Passage," the river Glenelg may be described as safe and easy to navigate with cargo-boat or small steamer. Above the rapids cargo-boats might ply, for fully half the year, to a distance of 25 miles; but this last-mentioned navigation would be uncertain between the months of May and November. The Gairdner and Fish Rivers have a tide of not less than 10 feet; water communication to a limited extent, therefore, could be depended upon in these rivers for the same period as in the case of the upper Glenelg.

With regard to the internal communication of the district, it will suffice to state that there would be no great difficulty in the construction of roads: but lines of railway would in several directions entail great engineering difficulties, owing to the naturally precipitous character of the hills, and deep stream-beds of the rivers and gullies.

## THE DISTRICT OF ROEBUCK BAY; CLIMATE, EXTENT, PASTORAL RESOURCES AND GENERAL CAPABILITIES OF THE SOIL.

The country explored to the eastward of Roebuck Bay between the 17° and 18° S. lat. and along the sea-coast from the head of Roebuck Bay to Cape Latouche Treville, although only 150 miles to the southward of the Glenelg district, offers a remarkable contrast in point of climatic phenomena. The mean temperature in the shade is here only 6·4° lower than in the Glenelg district, and the solar radiation 50 miles eastward of the sea-coast, although generally 5° lower, is occasionally a few degrees higher; nevertheless the amount of humidity in the atmosphere is here very greatly decreased. In this month, May, the weather is found to resemble that of the Glenelg District in July. Clear cloudless days and nights prevailed, and only such winds, a few miles inland, as serve to keep the air in a perceptible motion; so that the days, although the thermometers read high, are not so warm but that a man can walk 20 or 30 miles without inconvenience from the heat; on one occasion, indeed, our exploring party walked 45 miles of *course* between the hours of 6 A.M. and 9 P.M. The annexed meteorological tables will in part account for this. The dryness of the atmosphere is like that of the Champion Bay district in the month of October or early in November, when a man can work eight or ten hours of day in the open air without suffering on

account of heat. May seems to be an early spring month: the trees are just coming into flower and the grass is everywhere green; the natives take considerable trouble to burn their hunting grounds to entice the game with young feed; but so speedily does the grass grow again, that in a few days the burnt place is once more green, before the ash of the former grass has been displaced by wind or showers. For nearly a week before the party landed, showers were occasionally seen to fall over various parts of the country, but during the period of the land exploration no rain fell. There was more or less dew every night, but an hour after sunrise it had all disappeared.

The mean atmospheric pressure, temperature, &c., for the month of May, from the 1st to the 23rd inclusive, is shown in the following Table:—

| Date. | Mean Atmospheric Pressure. | Mean Temperature (shade) | Mean Maximum. | Mean Minimum | Mean Diurnal Range. | Mean Solar Radiation. | Mean Dew-Point. | Mean amount of Dew. 0—10. |
|---|---|---|---|---|---|---|---|---|
| 1864. May | 30·139 | 81·1 | 85·7 | 69·6 | 15·7 | 15·2 | 71·8 | 1·2 |

The mean hygometric conditions, &c., will be found in the annexed Table:—

| Date. | Hygrometer. | | | | | | | | Total Rain in Hours. | Mean Daily Amount of Cloud. 0—10. |
|---|---|---|---|---|---|---|---|---|---|---|
| | 9 A.M. | | 3 P.M. | | 9 P.M. | | Mean for the Month. | | | |
| | Wet. | Dry. | Wet. | Dry. | Wet. | Dry. | Wet Bulb. | Dry Bulb. | | |
| 1864. May | 72·1 | 78·2 | 76·7 | 83·1 | 77·3 | 81·8 | 75·6 | 81·1 | 0· | 0·91 |

The direction of the winds, reduced to eight points of the compass and the force estimated by the Beaufort notation, observations being made at 9 A.M., 3 P.M., and 9 P.M., are recorded in the Table subjoined:—

| Date. | N. | | N.W. | | W. | | S.W. | | S. | | S.E. | | E. | | N.E. | | Mean daily force of Wind 1—12. | Calms. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Force | No | Force | No | Force | No | Force | No. | Force | No | Force | No. | Force | No | Force | | |
| 1864. May | 0 | 0 | 3 | 5 | 6 | 10 | 7 | 14 | 1 | 2 | 27 | 73 | 12 | 16 | 3 | 4 | 1·79 | 10 |

The extent of explored country within the limits already mentioned as far eastward only as the meridian of 123° includes an area of 3300 square miles; but from what has been seen at the

most distant stations from our depôt, there is every reason to believe that the same kind of country extends eastward at least as far as the Fitzroy River, in long. E. 123° 30′; and southward we know not to what extent. The known portion, however, contains 2,112,000 acres of perfectly level country,—so level that with the exception of the sea-coast range of sand-hills and three little hummocks near Cape Villarêt, no spot traversed eastward from the depôt exceeded 50 feet in altitude. Of these 2,112,000 acres, perfectly level, well-grassed and almost treeless plains occupy 80,000 acres, the one-half of which lie round the south and east shores of Roebuck Bay, and the remainder inland from or east of Lagrange Bay. These plains possess chiefly an alluvial soil capable of growing many tropical productions; they are fringed with belts of moderately large Cajeputi trees. In the native wells, which are found on these plains at intervals of not more than a mile, water is obtainable within 16 or 18 feet, whilst within the belt of Cajeputi trees it is found plentifully within 4 or 5 feet of the surface. The rest of the country consists of grassy plains with shrubs and small timber chiefly of the order Myrtaceæ, sub-orders Chamælaucieæ, Leptospermeæ, Myrteæ, not growing so thickly as to impede rapid riding except where thickets occur. These thickets are rather difficult to traverse on account of the mass of dead wood, the accumulation of years, not because of the density of the vegetation; once burnt thoroughly, as thickets they would disappear. The grass is fine, sweet, and plentiful; our route crossed no sand plains or barren places; in May the grass averages one foot in height, and it is quite green. A distinguishing feature between the grass of the Glenelg District and that found here must be mentioned, as upon it is based the comparatively low estimate of sheep-grazing capability. The grass grows in *tufts.* (This is also the case in certain highly valued parts of the already settled districts of Western Australia.) For this reason, as it is as well to under-estimate the carrying capability of a newly discovered country, a deduction of *one-half* its supposed carrying power is now made, although it is more than probable that the experience of the future settler will declare the amount to be greatly underrated. This premised, the known parts of the Roebuck Bay District, within the limits already mentioned, may be safely asserted to be capable of carrying upwards of one million of sheep.

No evidence of mineral resources was discovered in sufficient quantities to warrant more extended research. Building materials do not abound. The indigenous vegetable resources are very similar to those already named in reporting of the Glenelg country. The Baobab, palm, and pine do not occur here, and the timber generally can only be described as affording an ample supply of

firewood and an inferior material for fencing. With respect to perfume plants, however, the whole district is particularly rich. Nearly every tree and plant in flower yields a strong and grateful odour; the dwarf myrtle, so common here, perhaps, has the most powerful odour; but some of the acaciæ and small shrubs possess scents exquisitely beautiful. The perfume of the heliotrope, the violet, the clove pink, the rose, the stock, were all recognised; but many others, although delicious, were such as could not be likened to that of any commonly known plant or flower. Such animal products as are found here are already included in the list given of those within the district of the Glenelg.

*Harbours and Internal Communication.*—Roebuck Bay was well explored by Mr. Arthur Du Boulay, during the absence of the expedition inland. Six days were spent in its examination. It is a sheet of water at high tide extending 15 miles inland and having an opening from Cape Villarêt to the opposite coast of Dampier Land of no less than 22 miles; but if a line be drawn from Cape Villarêt to Point Gantheaume, the land dry at low water is at no point distant more than 4 miles from that line. The bay is thus reduced for the purposes of navigation to a trifling indentation of the coast line not exceeding an average breadth of 2 miles at the most. The whole of this is very shallow, 3 fathoms at low water, with the exception of a narrow channel running parallel from Cape Villarêt along the south-east shore of the bay. At a distance of $1\frac{1}{2}$ mile to the north of Cape Villarêt this channel has a depth of 12 fathoms, but on tracing it up the bay it is found to shoal rapidly and ultimately disappeared at $6\frac{1}{2}$ miles in a north-east direction. If a line due north from Cape Villarêt be drawn, after crossing the narrow channel just mentioned, for 20 miles extensive shoals are formed which give in no instance deeper water than 4 fathoms upon that line. The anchorage, however, in or near this deep channel is good and the ship is protected from the strong south-east breezes by the sand-hills of the coast; nor is it found a bad anchorage during south-west, south, east, or north-east winds. No strong wind has yet been registered from the west, north-west, or west. Only one detached rock, dangerous to shipping, has as yet been seen, and that is situated off Cape Villarêt, at a distance of about 1 mile north by west from the beach at the foot of the Cape; it is well above water at low tide. The bay has a series of fine sandy beaches from Cape Villarêt in a north-east direction for 12 miles; to these succeeds a mangrove fringe, attaining its greatest density and breadth at the head of the bay. High water at full and change occurs at 10 A.M. Spring-tides rise $23\frac{1}{2}$ feet; neap-tide 12 feet.

Lagrange Bay as a harbour is of still less value than Roebuck Bay. It is only an indentation of the coast line to the extent of

4 miles at the deepest part. Viewed from the high land on Cape Latouche Treville it appears to be shallow. There was no opportunity to obtain soundings in Lagrange Bay. From the hammock on Cape Latouche Treville, whose summit is 180 feet above mean sea-level, an excellent view of the bay was obtained extending all round its coast line to Cape Bossut and Casuarina Reef. No considerable stream, perhaps not a creek, falls into the sea by this bay.

Throughout the country explored in this district there is an entire absence of rivers and even creeks, except a number of very short ones between Cape Villarêt and Cape Du Boulay. Land transit, however, is exceedingly easy, for the country is perfectly level; the soil, at a greater distance than 2 miles from the sea coast, is a red sandy loam without stone and only rarely showing a very fine gravel upon the surface. It is sufficiently hard for heavy drays to traverse it in any direction: nor does it seem likely to cut up much with continuous traffic.

Summary of pastoral and other lands explored on the North-West Coast:—

| District. | Area in Acres. | Estimated carrying capabilities (sheep). |
|---|---|---|
| Glenelg .. .. .. .. .. | 1,000,000 | 1,000,000 |
| Augustus and other islands .. | 80,000 | 80,000 |
| Roebuck Bay .. .. .. .. | 2,112,000 | 1,056,000 |
| Dampier Land (?) .. .. .. | 2,400,000 (?) | 1,200,000 (?) |
| Totals .. .. .. | 5,592,000 | 3,336,000 |

The following Table shows the direction and the force of winds experienced on the coast between Champion Bay and Camden Sound:—

| Date. | N. | | N.W. | | W. | | S.W. | | S. | | S.E. | | E. | | N.E. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | Force | No | Force. | No | Force | No | Force | No | Force | No | Force | No. | Force | No | Force. |
| 1863.—June . . | 1 | 1·0 | 4 | 13 | 5 | 15·5 | 4 | 8 | 5 | 0·0 | 11 | 39 | 6 | 28 | 21 | 67 |
| „ August . . | 1 | 4·0 | 3 | 10 | 5 | 26·0 | 7 | 17 | 1 | 0·5 | 18 | 68 | 6 | 17 | 5 | 14 |
| 1864.—March . . | 2 | 11·0 | 3 | 4 | 4 | 7·0 | 14 | 66 | 2 | 5·0 | 20 | 79 | 5 | 14 | 7 | 23 |
| „ May 24 to June 5 . . | 2 | 11·5 | 2 | 15 | 4 | 22·5 | 1 | 5 | 0 | 0·0 | 20 | 86 | 4 | 15 | 6 | 34 |

## THE ABORIGINES OF THE DISTRICT OF ROEBUCK BAY.

The tribes of natives in the interior excel those of the sea-coast in bodily structure. They are more muscular, taller, and appa-

rently more intelligent; at any rate, the expression of their countenances is more pleasing: some of those we met had a profile more resembling that of a Polynesian, or a Kelœnonesian of the first division (New Hebrides, &c.), rather than that of the second division to which the Australian belongs. Of the form of the head (it is an argument from the particular to the universal, for my data are founded upon the examination of the only human skull discovered during the exploration inland),—it is as well perhaps here to give the chief particulars. The facial angle, as indicating the proportions of the cranial cavity and the grade of intelligence, contrasts very favourably with that of the lower types of the Australian native; whilst this angle of the latter is included within an arc of 85°, that of the skull before me measures 94°, or only 1° less than the average facial angle of the European. The occipito-frontal diameter measures 7·23 inches; the inter-parietal 5·31 inches; the vertical height from the glabello-occipital line 4·5 inches; from the level of the glabello-occipital line on each side, across the middle of the sagittal suture to the same point on the opposite side 11·75 inches; the longitudinal arc from the nasal depression along the middle line of the skull to the occipital protuberance 13·1 inches; the horizontal circumference in the plane of a line joining the glabella with the occipital protuberance 20·7 inches. The walls of the cranial cavity are less thick than in the skull of an adult aboriginal of the southern parts of Australia. The malar bones are prominent; the zygomæ make a wide curve outwards, giving breadth to the face. The upper jaw is so prognathic as to give a very oblique insertion of the teeth.

The eyes of the inland aboriginal are black, and set very deep; the nose in some is a great deal flattened; the nostrils in a few instances were observed to be larger laterally than forwards; the mouth exceeds the average size, but, generally, was well formed, and without the usual accompaniment of thick lips. The chin is of proportionate size, neither long nor broad. The lower part of the face is prominent; the teeth are beautifully even and white. The hair, when allowed to grow naturally, appears in spiral locks about three or four inches in length, spreading out all over the head; its texture may be described as wavy-crisp or frizzled, not strongly; and its colour is what is generally styled a jet-black. The prevailing fashion in both sexes seems to be, to allow the hair to grow long and then to gather it all smoothly to the back of the head, and there tie it in a knot about the size of a cricket ball. No instance was seen of the addition of colouring or oleaginous matters as beautifiers of the hair. The moustache and beard are about equally abundant; these possessions seem as much treasured as coveted: some who rejoiced in them carefully bound the beard beneath the

chin with a wrapping of string, others trained the moustache into a horizontal spiral after the fashion of the King of Italy; others again whose upper lips were deficient in quantity of hair, wore *false hair*, that is, they supplemented that deficiency by a piece of dark-haired opossum skin, cut to the required shape.

In colour these natives are decidedly *black;* as black as we might expect to find a people in a locality elevated but a few feet above mean sea-level—with large tracts of alluvial soil—and near enough to the equator to feel the influence of the moister character of tropical heat. There are, however, two shades very distinctly marked, like the blonde and brunette of the white race; in one of these shades a bluish hue predominates, in the other the colour might be described as a reddish black.

These natives of the interior wear no clothing whatever, and their shelter from the cold and rainy weather seems to be of two forms: first, a hut of the rudest description, made of a few boughs piled loosely together, affording but little shelter from either wind or rain; and secondly—an arrangement somewhat more complicated but equally defective—a platform of brushwood laid evenly to a height of about one foot above the ground, beneath the centre of which a circular hole wider at the base than at the top, is scraped out of the soil, deep enough and of sufficient size to contain the persons of one or two individuals coiled up, as it were, beneath the overhanging sides of the cavity.

This kind of habitation is used, doubtlessly, in dry but cold weather; when it rains, it is probable they make use of the platform of sticks above the hole, as a sitting or reclining place; it would answer to keep them from the wet earth and that is all. For the greater part of the year, their primitive hut would suffice in exposed situations, if protection of any kind be needed; but during the periodic tropical rains these people, resident in a level country where no cave or other natural shelter is at hand, must practice no mean amount of patient endurance. They seem, nevertheless, to attain a good old age, in spite of privations and exposure; we fell in with several old men and women who had evidently lived many summers more than fall to the lot of Australian natives in general.

Foremost among the ornaments in common use by these people ranks the pearl-oyster shell of the coast. The centre of this shell, that is, so much of it as can be ground into an oval shape whilst retaining the nacreous substance very nearly flat, is either worn plain or engraved. In the manufacture of these plain ornaments, nothing more is required than the grinding away of about two-thirds of the entire substance of the margin of the shell, the drilling of a hole through it near one end of the smaller diameter, and the sus-

pending of the shell by one or more thicknesses of the native string. But the more valued ornament, after passing through the processes enumerated, has its nacreous surface completely covered with a lace-like pattern composed of four and five sided figures, combined in a very curious manner and included within one or several parallel elliptical lines running equi-distant from the ground edge of the shell. These figures composed of three or more series of the lines, are engraved to a depth of about ·025 of an inch; then the spaces are filled up with a black pigment, a mixture of gum and charcoal. Amongst the minor ornaments examined may be mentioned a necklace made of the claws of a crab (Porcellana, a genus of anomurous crustacea found only occasionally on the north-west coast of Australia): the pieces composing the necklace were about the size and shape of large bugles, similar to those used in ladies' fancy work; and a hair-pin made out of a kangaroo's tooth—an incisor of the lower jaw of one of the larger species of Macropidæ. These natives are as fond of personal decoration in plastic colours done in small round spots upon the legs, arms, and upper parts of the body, as other Australian tribes. Some years ago, at a famous native festival in south-west Australia, several men were painted round the neck in imitation of the then fashionable ladies' lace-collars, with lappets down the breast: this was very neatly executed with a white paint made of pipe-clay, laid on in minute spots with an extempore brush; this kind of painting we also noticed in the case of an individual amongst the group we first met in the interior, but the colouring included four tints and extended down to the feet in a harlequin-like pattern.

As this race of people have no rivers or deep-sea inlets to cross, the craft already described as commonly used by the natives of the Glenelg district is of rare occurrence here. The instrument of most general utility is in the form of a scoop; with this they dig wells, and the indigenous roots used as food; it is their basket and port-manteau: their water-jug and shovel. It is of very varied size and shape, both these latter depending upon the elbow of the tree from which it is cut; so important an instrument is it, that as a rule it receives the highest possible degree of ornamentation; it is carved, sometimes inside and outside, with closely adjoining parallel lines, disposed in a zigzag pattern. Some of the larger scoops are not carried from place to place with the tribe, but left beneath some bush in the neighbourhood of a well: these larger instruments are those which receive the maximum amount of decoration. For cooking purposes they use large shells, species of Strombus and Triton; (the seed of the mangrove undergoes a most elaborate process in its preparation as an article of food). They also make bags of kangaroo skin, fastened with a twine made of the fibres of

an Anatherum, and a species of the Liliaceæ; a kind of twine is also made here of a mixture of opossum hair and vegetable fibre; another kind, which was found in use only as a means of suspending the engraved shells, was made of human hair alone.

These natives do not seem to be acquainted with the use of the womera, or throwing-stick. The spears we saw with each tribe or party we presume to be hunting-weapons; these are ill-shapen and not barbed; in some cases they were pointed at both ends; in every case they were intended to be thrown by the hand from the middle: some natives carried bundles of small spears only 3 feet in length; these were no doubt designed to spear small birds, whilst the thrower was in ambush. The usual stone hatchet of the Australian native is everywhere found on this coast. The kiley, however, is a superior instrument to that used by the aboriginal of the south-west coast; its shape more nearly approaches the bomerang of the Eastern Australian: but it is not so effective an instrument either in war or in the chase; both the kiley and the bomerang of Australia are instruments as inferior to that used by the ancient Egyptians as their weapon was inferior to that of the Assyrian huntsman. But notwithstanding the inferiority of the kiley of these natives, it is a weapon in their hands worthy of attention in an engagement; on a shield obtained, there were several indentations made by the kiley. The shield alluded to differs from that common to southern tribes in being cut out of the solid; it has a handle with a sufficient space for the hand of the holder also cut out of the same solid piece. Although heavy, it seems to have done the original owner good service in warding off blows from the kiley in its bizarre and rapid flight.

As concerning the natives of the sea-coast, it will suffice to state that they are inferior to the natives of the interior in physical development; they are less cleanly in their persons and less industrious in the chase. The same extraordinary mutilation, referred to by the officers of the *Beagle* when describing the sea-coast tribes of this district (Stokes, vol. i., page 117) was observed by members of our expedition; but the custom does not extend beyond the tribes of the coast.

The language of both sea-coast and inland tribes, judging from a limited vocabulary of about seventy words, is agglutinate, with Malay affinities few, obscure, and only partially recognised; the dialects prevail over exceedingly small areas, as is the case with eastern Kelœnonesian tribes. The following vocabulary, in the construction of which the Italian vowel sounds* are adopted, will serve to illustrate these remarks:—

* The vowels marked with a grave accent are long, those with an acute are short.

| English. | Sea-coast Tribes. | Natives of the Interior. |
|---|---|---|
| Acacia | Íroòal. | |
| Ant | Winbordo. | |
| Arm (from shoulder to elbow) | Kondalélé. | |
| Arm (forearm) | Míarra. | |
| Baby | Bábá | Bábí. |
| Bad (or useless) | | Málo. |
| Bean | | Wongárámi. |
| Beard | Moolguh. | |
| Boat | Kaila (Kyla). | |
| Boomerang | Langi | Minduro. |
| Boomerang, to throw the, *v.* | Irgalleh. | |
| Child, singular or plural | Bábá. | |
| Claw (of a crab) | Nímallah. | |
| Clyanthus | Woolgah. | |
| Crab | Wangadah. | |
| Dog | Yeeli | Elì. |
| Dowak (a weapon of war) | Wallhalbìdì. | |
| Ear | | Barboo. |
| East | Kourrlah. | |
| Eyes | | Yarrìmi. |
| Finger (1st phalanx) | Nímargo. | |
| ,, (2nd phalanx) | Nurrah. | |
| ,, (ungual phalanx) | Nilldì. | |
| Finger nails | Dìdah. | |
| Fire | | Kambo. |
| Firewood (fuel) | Jöongo. | |
| Food | | Bìdah. |
| Foot | Níwáhl | Yarrawell. |
| Girdle | Binderah. | |
| ,, tassel attached to | Ninbah. | |
| Good (I understand, &c.) | | Cardo. |
| Grass | Koleo. | |
| ,, dry or dead; fuel | Jöongorero. | |
| Hair-band | Wondongò. | |
| Hand | | Yarrmullah. |
| Hawk | | Tarnuni. |
| Kangaroo | Nármlì | Karrakullah. |
| Laugh, to, *v.* | Mimjìllì (j French). | |
| Lie down, to, *v.* | Jerung. | |
| Mangrove seed | Makkama*dine*. | |
| Moon | Keredì. | |
| Mouth | | Jower. |
| Mussel | Dukarrah. | |
| My, mine; used sometimes interrogatively: as, Let that be mine? Is that mine? May I have it? | Darno. | |
| North | Koënyah. | |
| Nose | Noomàloo | Íremmalhul. |
| Opossum | | Parru*dine*. |
| Pearl shells | Irèdzì | Egí. |
| Red ochre | Darboolhah. | |
| Red pea | | Gingalgwor*ine*. |
| Road or path | Margoorh. | |
| Sea | Narlgolah. | |
| Sea egg (Echinus) | Gindel. | |
| Sleep, to, *v.* | Goolì. | |
| South | Barno. | |

# THE NILE
*and its*
## WESTERN AFFLUENTS.
*between the*
## ALBERT NYANZA ON THE SOUTH,
*and the*
## SOBAT ON THE NORTH;
*Founded on the*
Astronomical Observations,
Bearings and Distances, of
John Petherick, Esq^r^
*as well as numerous other documents,*
*Constructed by*
John Arrowsmith.
1865.

The Rivers Nile Gazelle and Sobat
M^r Petherick measured [illegible] depth &
[illegible] Discharge (Cubic feet) a second

| | | |
|---|---|---|
| [illegible] | 8 280 | 2 936 |
| [illegible] | 1 656 | |
| [illegible] White Nile | 3 042 | |
| [illegible] | 2° | 5 625 |

5 10 20 30 40 50
English Miles

M^r Pethericks Routes as well as those of his Agents Mussaad & Awat are coloured [illegible]

Heights determined from the temperature of the Boiling Point of Water observed by M^r Petherick

| Date | | Name of Station | Corrected for Instrumental Error |
|---|---|---|---|
| 1861 | May 11 | Alexandria | |
| | Aug 11 | Koroska | 605 |
| | Mar 11 | Khartum | 969 |
| | May 11 | Aliab | 1133 |
| 1862 | June 20 | Gaba Shambil | 1192 |
| | July 9 | Lohnun or Abu Kuka | 1262 |
| | Oct 4 | Adiel in Agar | 1277 |
| | Dec 1 | Neangara | 1089 |
| | Feb 3 | Rageh | 1312 |
| 1863 | 16 | Birra in Neambara | 1340 |
| | 20 | Gondokoro | 1428 |

| English. | Sea-coast Tribes | Natives of the Interior. |
|---|---|---|
| Spear for hunting) .. .. .. | Mangol. .. .. .. | Irakullah. |
| Sponge .. .. .. .. .. .. | Roogurro. | |
| Stars .. .. .. .. .. .. | Mungurah. | |
| Sun .. .. .. .. .. .. .. | Roomarrah. | |
| Tattooing .. .. .. .. .. | Markoodah. | |
| Thigh .. .. .. .. .. .. | Ballungerah. | |
| Throat .. .. .. .. .. .. | Yarrmallah. | |
| Thumb .. .. .. .. .. .. | Karkorgi. | |
| Water .. .. .. .. .. .. | *Woollah* .. .. . | *Woollah.* |
| West .. .. .. .. .. .. | Yalban. | |
| *What is the name of it?* .. .. | Nambomung .. .. | Nambo. |
| What is that? .. .. .. .. | | |
| Woman .. .. .. .. .. | Banggooth .. .. | Bungoom. |
| Zenith .. .. .. .. .. .. | Karlbah. | |

By this it will be seen that the language ignores sibilant letters; many of our consonants these natives cannot pronounce at all; *e. g.* t, and its compound th. f. g. &c. In short, the language may be said to be composed chiefly of vowel and liquid sounds, with a limited number of consonants. The terminal h in many of the native words given above is very strongly marked, and is characteristic of and points prominently to the origin of the dialect. The letter r is rolled in the native pronunciation after the manner of the French.

## XX.—*Land Journey Westward of the White Nile, from Abu Kuka to Gondokoro.* By J. PETHERICK, Esq., late H.B.M. Consul, Soudan.

*Read*, April 25, 1864.

[The following account of Mr. Petherick's land journey, with the exception of the tables of observations now printed for the first time, formed part of the Report which he furnished to the Society on the Speke and Grant Relief Expedition, and which was published, soon after it was read, in the 'Proceedings,' vol. viii. p. 129. It was then stated that the geographical results of the journey would be reprinted in the 'Journal,' accompanied by a map. The map, as will be seen, shows the connection between Mr. Petherick's land route and the explorations of all other travellers in this region, between the Ghazal on the north and Lake Albert Nyanza on the south. It has been compiled by Mr. Arrowsmith, after long and conscientious study of all available materials, including the well-kept field-books of Mr. Petherick and his assistant, Dr. Munzo.

Mr. Petherick's original Report commenced with an account of his preparations and difficulties at Khartûm. He left that place on his voyage southward, March 20th, 1862, passed the mouth of the Sobat on the 8th of April, and on the 17th reached the confluence of the Bahr-el-Ghazal. The season being very unfavourable, contrary winds and continued rains impeded his progress: and on the 2nd of July, having reached the station of the

Messrs. Poncet at Abu Kuka, he resolved to abandon the attempt to continue his journey to Gondokoro by water. At this point, therefore, his record of the land expedition commences.]

*July 2nd*, 1862.—Arrived at Abu Kuka, or Lolnun, and the elder Poncet gave us as hearty a welcome as the swamp he inhabited could afford. He had sent us his only towing-line, and the country affording no palm-trees no raw material was procurable. Under these circumstances, to quit the boats and proceed by land was the only alternative; and Jickwi, the Kytch chief, promising porters with alacrity, I at once decided to proceed *viâ* the Aliâb to Gondokoro, or my station, as circumstances might dictate.

*July 4th.*—The doctor's boats and consort joined, and the donkeys were sent on to Adôr, some 12 miles' distance westward, where Poncet possessed a hunting-station. The chief Jickwi had promised porters to conduct us to the Aliâb from Adôr: but, on eliciting particulars, I found the payment was expected to consist of a cow for each porter. The necessary cattle were to be obtained by a razzia on my part against the Aliâb, with whom the Kytch were at feud. The proposal was declined, and the upshot of a long conversation with Poncet and a palaver with Jickwi was, that I must proceed to the Rohl, some fifteen days' journey due west. At that place I could obtain porters for copper bracelets, and thence any desired number of negroes for the same commodity or beads, to my station, presumed due south. Poncet's principal station was at the Rohl; therefore, his statements seeming reliable, I decided to adopt the route, although a terribly roundabout way to Gondokoro. On the 8th of July a party of negroes were despatched with loads to Adôr.

*July 11th.*—Got out my gutta-percha punt, and, to the agreeable surprise of our men and some wondering negroes, I rowed Mrs. Petherick across the Nile.

*July 17th.*—Several heavy storms had considerably damaged our stores, and quantities were thrown overboard.

*July 18th.*—Bright morning; thunderstorm and drenching rain at noon. At 3 P.M. sent off another lot of forty-five porters.

To Surkatti, under orders for Gondokoro to await us and support Captains Speke and Grant in case of their arrival, was given the dispensable cordage from the standing rigging of three boats (which were to return down river), to serve for towing-lines to conduct him to the Shyr. At that place raw material was known to exist sufficient for the manufacture of any amount of cordage he might require for his necessities till he reached Gondokoro.

Preparations were completed by July 25th, and his boat laden deep with stores, the liberated children, and a guard of twelve men, Surkatti, with the good wishes of all, spread his sails to a favouring breeze.

*July 27th.*—Jickwi and the porters became exacting, and, in lieu of a pair of copper ear-rings or a bracelet, a cow for each porter was insisted on. "If I was to rob any one, I would sack his house and village for breach of contract; and I could forego the goods already forwarded to Adôr, if unable to proceed thither in person." The argument was conclusive, and in the afternoon Mussaad, with an escort, accompanied a party of laden porters to Adôr.

I was occupied on the 29th July with final preparations for the return of the boats and our journey inland. Everything was prepared for leaving by the next day. Means were taken to provide a reinforcement of men and additional stores, with the despatch of the boats from Khartûm to Gondokoro, as early as possible in the approaching season.

*July 31st.*—The negroes having disappointed us, we set out alone at noon with a small party only of our men, who by this time had become familiar with the route. The Doctor and Foxcroft were left to bring up the last loads, for which we hoped to send the required porters from Adôr. The boats also were about to leave their moorings for Khartûm, and with heavy hearts their crews took anxious leave of us.

We proceeded on horseback, through slush and marsh, and over water in our punt. We passed the night in a kraal. The greater part of the cattle lay in water, and to all intents and purposes, like their masters, had become amphibious.

*August 1st.*—A continuation of marsh to the precincts of Adôr, where we found our tents pitched outside the station. Jickwi and our active agent failing to procure porters at any price short of cattle to be stolen from the Aliâb, had, to lose no time, at quadrupled rate of copper bracelets, hired twenty negroes to proceed with sixteen laden donkeys, supported by an escort of twenty-seven men, under an old hand, to the Rohl, some sixteen days' march due west. From this date our Diary* was regularly kept; and as I forward it for your inspection, I need now but touch upon the principal events of our journey, which therein may not be sufficiently explained.

*Aug. 11th.*—Notwithstanding the endeavours of Deraden, chief of the village, Jickwi's brother, we could not obtain sufficient porters for even the most indispensable of our requirements. Therefore, on the 15th of August, we were constrained to leave 150 loads behind. Left Adôr with forty porters, eighteen laden

* This contains all the details of bearings, dead reckoning, observations for latitude, longitude, and altitude from day to day, which form the material on which the accompanying map of the route has been constructed.—[Ed.]

donkeys, six trained bullocks, and several head of cattle, purchased at 15 shillings a-head for our requirements on the road.

*Aug. 19th.*—At 3 P.M. we arrived at some fishermen's huts, forming a hamlet called Jemid, on the bank of an apparently boundless lagoon, called Faragau, conducting to the river Haugau; supplied by streams from the south, and discharging itself into the Nile at the northern extremity of Gaba Shambyl, in the territory of Fouaer. The lagoon divides the Kytch on the east from the Atwot and Rohl on the west. After the rains the waters subside into two or three channels, and the land affords coarse but abundant pasturage.

*Aug. 22nd.*—The fishermen of the hamlet, who yesterday had contracted for thirty canoes to ferry us across the lagoon, during the night have decamped with bag, baggage, and canoes.

*Aug. 25th.*—At 7·25 P.M. saw a comet, and observed distances —from Benetnasch, in Ursa major, 10° 3′; Ras Alhague, in Ophiuchi, 30° 53′; and Alphacca, in Coronæ Borealis, 25° 44′.

*Aug. 28th.*—The negroes of the adjoining village of Neot harbouring the fishermen, and refusing to barter grain or food of any description, we were obliged to occupy the village, and, in the event of a protracted refusal to ferry us over, were determined to subsist on their ripening grain until the drying up of the lagoon. The huts, at considerable distances from each other, were being abandoned, and the high corn dividing them was resorted to by the negroes, to all appearance bent on attacking us. Flanking our porters, we marched to about the centre of the village without opposition; and taking possession of a deserted set of huts in an enclosure for the deposit of our traps, our tent was pitched outside. High stages, used by the negroes as look-outs, were occupied by our sentinels. After a short palaver with a few of the natives, and a repetition of our requirements and intentions, canoes were promised on the following day.

A heavy shower of rain followed; and when about to cease, in lieu of the expected fishermen, we were astonished by flights of arrows, discharged by the negroes in the belief, as we afterwards discovered, that the rain would prevent the discharge of our fire-arms. Several shots from our wary men told a different tale: and hurrying, rifle in hand, to a stage to show them the effect of our arms, and daunt them at the least possible expense of life, at 300 yards I picked off a leader backed by a strong party.

The man was no sooner down than his men relieved him of his bow and arrows, and fled. Our attendant, Ringa, true to Nyam Nyam habits, administered the *coup de grace* in the head. I was sorry for it, and would have preferred having him a prisoner. His wife and son, a boy, fell into our hands. Four or five others had

fallen; and, finding their bows and arrows took no effect, the affair terminated.

*Aug.* 29*th.*—Three negroes presented themselves, and peace was offered and accepted. To ratify it, the next day, a white bullock was slaughtered, and ourselves, but particularly the tent, were elaborately sprinkled with water. Fishermen and canoes were promised to convey us on our way.

*Aug.* 31*st.*—A heavy storm and abundance of rain; our tent was inundated. Negroes did not show themselves.

*September* 3*rd.*—Seventeen canoes in waiting, we returned to our old quarters at Jemid. At noon the canoes were loaded, and sent on to a deserted kraal farther south, to which we followed in our punt on the next day. We had scarcely time to pitch our tent when a heavy storm inundated our baggage.

*Sept.* 5*th.*—The canoes, with a guard of ten men, heavily laden, with the greatest part of our stores, at 9 A.M., left to cross the lagoon, and return for the remainder.

*Sept.* 6*th.*—Some firing heard in the direction of Jemid was inexplicable; and at 7 A.M., twenty-one of our men, with forty porters, on their way back from the Rohl, came marching gaily up with colours flying. They had successfully crossed the lagoon the day previous; had seen nothing of our party of ten men and baggage; and, ignorant of our presence, had dismissed their canoes. They were on their way back to Adôr to fetch some of the remaining stores.

At 10 A.M. two shots were faintly heard across the lagoon, and we fancied they might proceed from our men, perhaps returning with the canoes. The day passed without intelligence of them, and suspicions were entertained that all was not right.

The return men from the Rohl, on their upward journey, had been deserted by the fishermen, after having ferried over their goods only; and the greater part of the men, at the risk of their lives, had to swim and wade alternately during an entire day to cross the water. Their porters, with the sole exception of the chief, Jickwi, took advantage of their opportunity and deserted. Reduced to their donkeys, they were obliged to advance short stages, and return for the remaining loads; thus they accomplished a weary journey to the Rohl, compelled to traverse the same ground twice over.

*Sept.* 7*th.*—Despatched, at 8 A.M., seven men and an interpreter —Kheir Allah—in the punt across the lagoon to look out for the advance party; proceed with them to Atwot, and endeavour to procure canoes.

At 5. P.M. five canoes were announced; they turned out to be our own men, who had left us with the seventeen canoes laden with goods on the 5th. They had evidently been roughly handled—

vouched for by bruised faces, cut heads, and swollen arms. The negroes had, in fact, betrayed them by upsetting, at a given signal, the canoes. The unfortunate men, struggling in deep water, were mercilessly clubbed on their heads, faces, and arms, held up to protect themselves; and two of the party sank to rise no more. The loss of goods was sad and irreparable, comprising photographic lens and chemicals, arsenical soap, and flaying-instruments; the whole of our stock of beads, four elephant-rifles and muskets, a pair of tusks, trophies of Carlo; the Doctor's, Foxcroft's, Carlo's, and the entire of the men's clothing, with other things too numerous to mention.

Fortunately two or three of the men retained their guns, and notwithstanding the immersion they did not fail them; and, killing as many negroes, the savages made off, leaving five canoes bottom up, by means of which they returned to us. To add to our misfortunes, Mrs. Petherick was suffering from fever, myself with lumbago, and our men, of whom many were invalids, were straitened for provisions.

*Sept. 8th.*—Embarked eight men, with the few stores we had left, in the captured canoes, and, at 5 P.M., after a hard day's work, they returned, having landed the goods in a deserted kraal, and consigned them to Abd-el-Kheir and his party, who had yesterday crossed in the punt.

*Sept. 9th.*—Sent out porters, under an escort, across the water; and, as Mrs. Petherick was too ill to move, gave orders for them to proceed with the baggage to the Rohl, and to return as soon as possible for us. In the mean time I retained the men and porters thence, who had joined on their way for more goods from Adôr.

*Sept. 10th.*—The canoes having returned, sent Mediné, an old servant, with a reinforcement, to join the men on the other side, and proceed with them to the Rohl, fearing lest a small force might come to grief.

*Sept. 12th.*—Returning from a morning ride, with some guinea-fowl, I was astounded to learn that our trusted agent, Mussaad, had been shot at, and killed instantly, by a youth of Moorish descent, in a quarrel. The lad was sitting some 50 yards off, in the expectation of a similar fate; but I handcuffed him instead.

*Sept. 17th.*—Mrs. Petherick, feeling herself equal to the task, although very weak, begged to leave the unwholesome spot; and, accordingly, we embarked our remaining baggage in the canoes, and, with astronomical instruments and our firearms, we entered the punt. Crossing the Haugau, we had navigated a narrow channel in the reeds, about a mile, and got into a strong current joining the central channel. Their united streams, called Amin, flowed north, and formed a stream about 30 yards wide, and 16 to

18 feet deep. We then passed into shallow water, from 1 to 3 feet deep, amongst high grass and reeds, with occasional open spaces of clear water.

The dense wood seen on the horizon from our camp on the Haugau was now but a short distance from us, and it also was inundated. Ant-hills became conspicuous, and we disembarked on one, whence our effects were carried by the porters to a deserted kraal, called Abael, and the canoes returned for the doctor and the rear. Thus the Lagoon was virtually passed; but although we were now on a spot of dry ground, the entire country as far as the eye could reach was inundated.

Hence through the Atwot territory we waded full three-fourths of the way to the Rohl, and at noon, Sept. 22nd, we reached the long-talked of Poncet station, near the village of Adael. The station consisted of an extensive stockade: the outer one was allotted to the cattle, and in the inner one, containing some 70 huts, we were allotted three thereof for our accommodation.

*Sept. 26th to 28th.*—The ways and means for further progress having been proposed, and my plans frustrated as much as possible by the agent of the station, to whom I had delivered a letter concerning us from his employer, my presentiments, gleaned *en route* from the men, at length were beyond a doubt confirmed, that without cattle I could not move.

What the intentions of Poncet and his agent at Adôr were, to mislead me by representing the Rohl as a bead-trafficking community, I could not imagine, as even the ordinary articles of consumption, such as moderate quantities of grain, honey, and tobacco, could only be obtained in exchange for a cow or calf. Had I chosen to rob cattle in order to pay the porters, I could have done so at the Adôr, and avoided all the inconveniences and heavy losses that had befallen us by following this impracticable and circuitous route. What was to be done? Indebted to the amount of some sixty head of cattle for the hire of the porters who had accompanied our men, whom we met on the Lagoon, the agent, for an equivalent of goods or money, could not, or would not, supply me with any more cattle. Neither would the negroes of the adjoining village dispose of any of their cattle for any consideration in our power to give them. The men's demands for cattle to purchase their different requirements, put off from day to day, rendered them troublesome and turbulent. They told me we could neither return nor proceed, and they would consent no longer to privations, whilst in possession of the means to obtain them, and, with or without my consent, they were prepared to join Poncet's men in a razzia.

The storm I had long foreseen brewing now burst, and, as

matters would be only aggravated by a refusal, I gave my reluctant consent. Our reflections, as may be supposed, were none of the pleasantest. In lieu of the introduction of more valuable and civilising merchandise, such as cutlery, or cloth for wearing apparel, as articles of barter, of which the negroes are very fond—when the value of glass beads and copper ornaments began to decline and to lose their charm—the traders disgraced themselves by descending to the level of the savages, and imitated them, on a larger scale, in their attempts to enrich themselves by the plunder and destruction of tribe after tribe. From this to slave-stealing, and the pursuit of the traffic was but a step, which, according to my experience, all the traders have learned, more or less, to indulge in. With the produce they pay their men, and realise such profits, that to many, I believe, the ivory trade is but of secondary consideration.

*October* 22*nd*.—A commotion in the village. Some cattle have been stolen by the natives from the Atwot, and traced to Adael; several women and children have been seized in the corn-fields, to be retained as hostages for the stolen cattle.

*Oct.* 30*th*.—Our marauders returned, and after the deduction of one-third for the men, as I was informed was usual, we possessed sufficient cattle for all of our requirements. The only casualty was the loss of one man, in an elephant hunt.

*November* 13*th*.—At length the arrangements had been completed, and with one hundred porters for ourselves and fifty for a detachment of Poncet's men, we left the station to proceed due south. Poncet's agent and fifty of his men accompanied us to bring back the negroes to their homes, as, if left to themselves, they would risk being exterminated by the tribes.

*Nov.* 14*th*.—Crossing a sheet of water, we suffered some inconvenience by the desertion of a number of our porters, and the loss of some loads, which, thrown into the high grass or water, could not be recovered.

Passing subsequently through the Djour territory, and entering that of Moro on the 30th November, we made Neangara, the village of a chief of that name, who ruled over a district called Moro Morokodo. The country traversed gained in elevation, and we were now enjoying the prospect of several hills. The Rohl porters, as also Poncet's agent, would proceed no farther; and as the aborigines would not carry loads, we were obliged to wait here until porters could be obtained from my station, situated at some eight or ten days' journey farther south.

*December* 2*nd*.—One-half of our men left for the required porters. Illness prevailed to a great extent amongst us, and, in particular, my dauntless wife and myself were great sufferers.

Neangara and the natives were well behaved, and paid us great attention: many of our men were known to them by name, having been here on former trading expeditions from the station.

*Dec.* 15*th.*—Our agent Awat arrived from the station with a numerous escort, and brought us upwards of one hundred porters; but I was too ill to think of moving for some time to come.

*Dec.* 16*th.*—Awat, having some months previously left merchandise for barter with several Nyam Nyam chiefs, about four days' journey westwards, proceeded with some hunters, thirty men, and all the porters to Makraka, a Nyam Nyam district. Provisions there were abundant, whilst Neangara could with difficulty supply us with a sufficiency.

*January* 12*th*, 1863.—Awat and his men, with about 10 cwt. of tusks, opportunely arriving, were gladly welcomed.

*Jan.* 17*th.*—Arrangements being complete, and we convalescent, left Neangara, and, travelling through an undulating and prettily-wooded country, occasionally intersected by brooks, we crossed in our punt a considerable and highly picturesque river, called Ayi. Its course was 10° (azimuth compass), and its breadth about 100 yards. The depth varied from knee to waist, and it was reported to contribute its waters to the Haugau, of which lagoon I believe it to be perhaps the principal feeder.

*Jan.* 25*th.*—After crossing another pretty stream, the Bibio, we arrived at my station, situated near the junction of the Bibio and the Ayi, formerly known by the name of Neambara, but really situated, not in that district, but near the village of Wayo, in the Moro territory. Our donkeys, originally forty, had now dwindled to fifteen, and I lost my horse.

*February* 12*th.*—Having waited for a change of porters, we proceeded easterly, *viâ* the Neambara, through a romantic group of hills, compared by our doctor to the Trosachs, the drainage of which, the river Queeny, flowed north, and emptied its waters also, it was said, into the lagoon of Haugau.

*Feb.* 16*th.*—A vast plain, inhabited by the Bari, was reached. Sixty men, a reinforcement from Khartûm, were met, who with four boats had arrived at Gondokoro. The men were bent upon searching for us, and conveyed the unpleasant news of the rumour of our deaths, as also a letter from Mr. Baker, dated Gondokoro.

The various sluggish, and now for the most part dried up, watercourses which traverse the well-wooded and fertile plains, take an easterly direction, and finally discharge themselves into the Nile below Gondokoro.

*Feb.* 20*th.*—Arrived at Gondokoro, and to our agreeable surprise were greeted by Captains Speke and Grant, as also by Mr. Baker—the former having preceded us by five days.

MR. CONSUL PETHERICK'S OBSERVATIONS. Computed by EDWIN DUNKIN, Esq., Greenwich Observatory.

Separate Results for Longitude.

| Station. | Month and Day. | Star or Planet observed with the Moon. | Resulting Longitude E. | |
|---|---|---|---|---|
| | | | Moon E. | Moon W. |
| | 1862. | | ° ′ ″ | ° ′ ″ |
| Khartûm .. .. .. | Feb. 19 | Jupiter | 32 46 15 | |
| | ,, 23 | Jupiter | 32 36 30 | |
| | Mar. 5 | Aldebaran | .. .. | 31 50 45 |
| | ,, 7 | Jupiter | .. .. | 32 11 0 |
| | ,, 8 | Jupiter | .. .. | 32 18 45 |
| | ,, 13 | Jupiter | .. .. | 32 43 30 |
| Lolnun, or Abu Kuka .. | July 7 | Jupiter | 30 24 15 | |
| | ,, 8 | Jupiter | 30 53 30 | |
| | ,, 16 | Sun | .. .. | 31 13 0 |
| | ,, 16 | Sun | .. .. | 30 45 45 |
| Adael .. .. .. .. .. | Sept. 30 | Mars | .. .. | 30 6 0 |
| | Oct. 4 | Mars | .. .. | 30 18 0 |
| | ,, 4 | Mars | .. .. | 29 51 45 |
| | ,, 5 | Antares | 29 33 30 | |
| | ,, 10 | Mars | 29 10 45 | |
| | ,, 11 | Mars | 29 24 45 | |
| | ,, 12 | Sun | .. .. | 30 42 30 |
| | ,, 14 | Sun | .. .. | 30 52 15 |
| | ,, 15 | Sun | .. .. | 30 47 0 |
| | Nov. 10 | Regulus | .. .. | 30 30 0 |
| | ,, ,, | Mars | 30 6 30 | |
| | ,, ,, | Regulus | .. .. | 30 13 30 |
| | ,, ,, | Mars | 30 29 0 | |
| | ,, ,, | Regulus | .. .. | 30 35 0 |
| | ,, ,, | Aldebaran | 29 37 45 | |
| | ,, ,, | Regulus | .. .. | 30 47 45 |
| | ,, ,, | Aldebaran | 30 12 0 | |
| Neangara .. .. .. .. | Dec. 1 | Sun | 29 32 30 | |
| | ,, 2 | Aldebaran | | |
| | ,, ,, | Altair? | .. .. | 30 41 45 |
| | ,, ,, | Aldebaran | | |
| | ,, ,, | Altair? | .. .. | 30 33 45 |
| | ,, ,, | Aldebaran | | |
| | ,, ,, | Altair? | .. .. | 30 19 45 |
| | ,, ,, | Fomalhaut | 29 52 0 | |
| | ,, ,, | Aldebaran | .. .. | 30 4 15 |
| | ,, ,, | Fomalhaut | 29 42 45 | |
| | ,, ,, | Aldebaran | .. .. | 30 5 0 |
| | ,, ,, | Fomalhaut | 29 40 15 | |
| | ,, ,, | Aldebaran | .. .. | 30 27 45 |
| | ,, 3 | Pollux | .. .. | 30 22 0 |
| | ,, ,, | Mars | 29 42 45 | |
| | ,, ,, | Pollux | .. .. | 30 35 15 |
| | ,, ,, | Mars | 29 55 0 | |
| | ,, ,, | Pollux | .. .. | 30 4 0 |
| | ,, ,, | Mars | 29 52 15 | |
| | ,, 13 | Sun | .. .. | 31 2 0 |

MR. CONSUL PETHERICK'S OBSERVATIONS—*continued.*

| Station. | Month and Day. | Star or Planet observed with the Moon. | Resulting Longitude E. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Moon E | | | Moon W. | | |
| | 1863. | | ° | ′ | ″ | ° | ′ | ″ |
| Neangara .. .. .. .. | Jan. 3 | Mars | 29 | 20 | 45 | | | |
| | ,, ,, | Regulus | .. | .. | | 30 | 18 | 30 |
| | ,, ,, | Mars | 29 | 34 | 15 | | | |
| | ,, ,, | Regulus | .. | .. | | 30 | 59 | 0 |
| | ,, ,, | Mars | 29 | 32 | 45 | | | |
| | ,, ,, | Regulus | .. | .. | | 30 | 23 | 0 |
| | ,, ,, | Mars | 29 | 52 | 0 | | | |
| | ,, 12 | Sun | .. | .. | | 30 | 56 | 0 |
| | ,, 13 | Sun | .. | .. | | 30 | 57 | 30 |
| Wayo .. .. .. .. .. | Feb. 1 | Regulus | .. | .. | | 30 | 30 | 15 |
| | ,, ,, | Mars | 30 | 24 | 45 | | | |
| | ,, ,, | Regulus | .. | .. | | 30 | 25 | 0 |
| | ,, ,, | Mars | 30 | 31 | 0 | | | |
| | ,, ,, | Regulus | .. | .. | | 30 | 28 | 30 |
| | ,, ,, | Mars | 30 | 18 | 30 | | | |
| Gondokoro .. .. .. | Mar. 25 | Venus | 31 | 58 | 0 | | | |
| | ,, ,, | Regulus | .. | .. | | 32 | 26 | 45 |
| Mouth of Bahr-el-Ghazal | Apr. 24 | Venus | 30 | 4 | 30 | | | |
| | ,, ,, | Jupiter | .. | .. | | 30 | 1 | 0 |
| | ,, ,, | Venus | 29 | 25 | 45 | | | |
| | ,, ,, | Jupiter | .. | .. | | 30 | 21 | 30 |
| | ,, 25 | Venus | 30 | 53 | 0 | | | |
| | ,, ,, | Jupiter | .. | .. | | 30 | 31 | 30 |
| | ,, ,, | Venus | 30 | 33 | 15 | | | |
| | ,, ,, | Jupiter | .. | .. | | 30 | 39 | 30 |
| Island of Kyt .. .. .. | Mar. 8 | Sun | .. | .. | | 29 | 47 | 45 |

## FINAL RESULT OF MR. CONSUL PETHERICK'S OBSERVATIONS.

| Date. | Name of Place. | Approximate Position. Latitude. | Approximate Position. Longitude. | Reading of Thermometer B P. | Temperature. | Height. Dunkm. | Height. Error of Instrument. | Height. Result. |
|---|---|---|---|---|---|---|---|---|
| | | ° ′ ″ | ° ′ ″ | ° | ° | feet. | + feet. | feet. |
| 1861.—Aug. 11 .. | Korosko .. .. .. .. | .. .. | .. .. | 211·0 | .. | 565 | 40 | 605 |
| 1862.—Mar. 16 .. | Khartûm .. .. .. .. | 15 37 28 N. | 32 28 42 E. | 210·4 | 89 | 913 | 56 | 969 |
| May 14 .. | Aliâb .. .. .. .. | .. .. | .. .. | 210·2 | 90 | 1029 | 104 | 1133 |
| June 20 .. | Gaba Shambyl .. .. .. | .. .. | .. .. | 210·1 | 82 | 1077 | 115 | 1192 |
| July 9 .. | Lohnun, Abu Kuka .. .. | 6 54 35 | 30 49 07 | 210·0 | 87 | 1141 | 121 | 1262 |
| Oct. 4 .. | Adael, in Agar .. .. .. | 6 35 53 | 30 08 04 | 210·0 | 84 | 1136 | 141 | 1277 |
| Dec. 11 .. | Neangara .. .. .. .. | 5 22 41 | 30 06 26 | 208·8 | 88 | 1831 | 158 | 1989 |
| 1863.—Feb. 5 .. | Wayo, in Moro .. .. .. | 4 46 00 | 30 26 20 | 208·1 | 90 | 2240 | 172 | 2412 |
| Feb. 16 .. | Burra, Neambara .. .. | .. .. | .. .. | 209·0 | 90 | 2165 | 175 | 2340 |
| Feb. 25 .. | Gondokoro .. .. .. .. | 4 55 00 | 32 12 24 | 209·8<br>209·8<br>209·9 | 99<br>100<br>96 | 1251 | 177 | 1428 |
| Apr. 24 .. | Mouth of Bahr-el-Ghazal .. | 8 58 40? | 30 18 45 | .. | .. | .. | .. | .. |
| May 8 .. | Island of Kyt .. .. .. | 8 27 13 | 29 47 45 | .. | .. | .. | .. | .. |

Consul Peterick was supplied with three boiling-water thermometers, made by Casella; all of them have been returned in good condition.

No. 2534 was lent to Mr. S. W. Baker at Khartûm in April, 1863; its error on return in Nov. 1865, was 0°·80 — from its readings.

No. 2535 } used by Consul Petherick .. .. .. .. .. .. .. { ditto ditto 0·76 — ditto.
No. 2536 } { ditto ditto 0·86 — ditto.

# APPENDIX.

*Remarks on the Chart to Captain Toynbee's Paper at page* 147.

By Staff-Commander C. GEORGE, R.N., Map-Curator R.G.S.

THE chart of a portion of the Southern hemisphere, which accompanies Captain Toynbee's paper, represents about one-tenth of the data which he collected during five consecutive voyages from England to India. The observations which he made in the North Atlantic, South Atlantic, and Indian Oceans, are being projected, and will form a supplement to the above. Fully to delineate the whole of his observations would require two charts of each part—one of them to show the surface-temperature, currents, and winds; and the other the barometric pressure, temperature of air, and specific gravity of water.

The *blue* contour lines represent the limits of the cold or ice-bearing current; the *red* ones those of the warm current, or that derived from tropical regions, as far as Captain Toynbee has examined them. The sloping *black* figures denote the temperature of the surface in precisely the same manner as the soundings represent the depth of water on an ordinary chart. It must be understood that the cold current comes from the westward, and the chart shows that its northern boundary in August and September is between the parallels of 39° and 42° S.; also that the warm current flows from the Indian Ocean in a south-westerly direction.

Off the Cape of Good Hope the two currents meet near the parallel of 39° S. and the meridian of 20° E., but the line of meeting may alter along that parallel in different seasons. The apparent effect of the junction of the warm and cold currents is to drive the latter about 2 degrees further to the southward, and also to divide each of the currents into two parts: some portion of the cold current is turned to the northward, and by its specific gravity it runs under the warm current, strikes the western side of the Agulhas Bank and comes to the surface near Table Bay, where its temperature is 52°, while at 60 miles off the shore the warm current is running north-westerly at a temperature of 68° to 70°—a difference of 16 to 18 degrees. At this meeting of the currents

the greater portion of the warm current continues to flow to the westward, between the Cape and the parallel of 39°; while some portion of the warm current is here turned, and carried to the eastward by the cold or ice-bearing current, which, after sending off a portion towards the Cape of Good Hope, continues its easterly direction along the parallels of 40° and 42° s. The cold stream, after passing Table Bay, continues to run northerly along the west coast of Africa, and its existence has been noticed by T. Baines, Esq., F.R.G.S., at Walvisch Bay, in latitude 23° s., where he found the water so cold and bracing as to be almost unpleasant for bathing, in the same year as the observations were made by Captain Toynbee at the Cape.

That the boundary of the cold water remains somewhat stationary, as noticed by Captain Toynbee, during the months of August and September, is supported by the fact that it was found in the same locality for four consecutive years, viz., between the parallels of 39° and 40° s., and between the meridians of 4° and 6° E.; also that the warm current follows the same law is established, for on the same parallel and near 15° E., the warm current was encountered and found there during the five years of examination, and in like manner in many other places. After passing the meridian of 25° E., the cold current is pushed 2 degrees further south, and still running to the eastward carries the warm surface-water with it, as is indicated by the direction of the arrows and the contour lines of warm current stretching out in points to the eastward.

Between the meridians of 45° and 55° E., and along the parallels of 40° and 41° s., the warm and cold currents become interlaced in a remarkable manner, as may be noticed on the chart. Now that the temperatures are projected in their proper places and their contours marked out, it becomes easy to follow the cold and warm currents by their respective temperatures;* and all the remarks of Captain Toynbee are clearly illustrated, in which he says "he passed through streaks or lanes of cold and warm water, where the sea was disturbed and so confused as to roll away the main-topgallant-mast, and when hail-storms were frequent." These peculiarities invite further examination into the phenomena of the *Geography of the Sea*, with a view to ascertain what effect the meeting of the cold and warm currents has upon the atmosphere immediately over them, in other parts of the ocean.

This chart may engage the attention of the mariner when shaping his course either way round the Cape of Good Hope. Vessels outward bound, when near the island of Tristan d'Acunha, should make for the cold-water current as soon as possible, as it runs in the direction of his course; and when homeward-bound

* See the 'Admiralty Manual,' Admiral F. W. Beechey's Paper, page 17, 3rd ed.

he should keep in the warm-water current for the same reason. Coming from the coast of South America, the chart would indicate that when near Tristan d'Acunha, it is safe practice to enter the cold-water current soon after passing that island, steering south-easterly between it and the cold-water patches, remarked upon by Captain Toynbee, in latitude 39° and 40° and 4° and 6° E., and keeping in that direction until they near the point where the meridian of Greenwich crosses the parallel of 43° s., in the temperature of about 46°. On this parallel (43° s.) the Cape may be passed, hauling to the northward or southward, according to the season of the year, and thus substitute the *thermometer* for the *lead*. Bear in mind the good old practice of Admiral Sir J. Norris; the three L.L.L's, viz., latitude, lookout, &c., will be a safe guide to avoid the icebergs on the south side, and to keep clear of the turmoil of the sea that may be expected along the parallel of 40° s., where the warm and cold currents mingle. Homeward-bound, keeping near the parallel of 36° s. will carry the warm current round the Cape.

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